

ARCHITECTURE John Gloag

Architecture provokes controversy. 'To build is to be robbed', states Johnson flatly; to Longfellow it was 'the noblest of all the arts'. According to John Gloag it is art on a grand scale; the story of civilization writ large. Gigantic Egyptian Pyramids, lofty Sumerian ziggurat, magically serene Greek Parthenon, massively stolid Roman temples, feathery-delicate Chinese pagoda, and other subtly magnificent Oriental dwellings-all these shout, sing, croon, whisper tales of the men who lived, worked, worshipped and played in their shadow. Architecture, while delving into intricacies of what, how and why men build, and the main architectural styles and periods from mud hut to modern skyscraper, strikes deeper issues: Is stark utility incompatible with beauty? How can architectural beauty or ugliness be assessed? Will the architect and the engineer be reunited? (They were once one and the same person.) What is to be the architecture of Western democracy?

Enthusiasm is the dynamite of this scholarly, thorough study, which is sometimes amusing, often provocative, occasionally near poetic, and always compelling in style and perceptive in thought. Authentic, contemporary sources are used to provide the numerous and colourful illustrations. The reader will be interested, challenged, possibly roused to disagreement, but never bored. John Gloag is well known for his works on architecture, social history and industrial design. Elected President of the Society of Architectural Historians of Great Britain in 1960, and re-elected in 1962, he is an Hon. Associate of the Royal Institute of British Architects and Hon. Fellow of the Society of Industrial Artists, and in 1958 was awarded the Bi-centenary Medal of the Royal Society of Arts for his services to industrial design.

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Architecture

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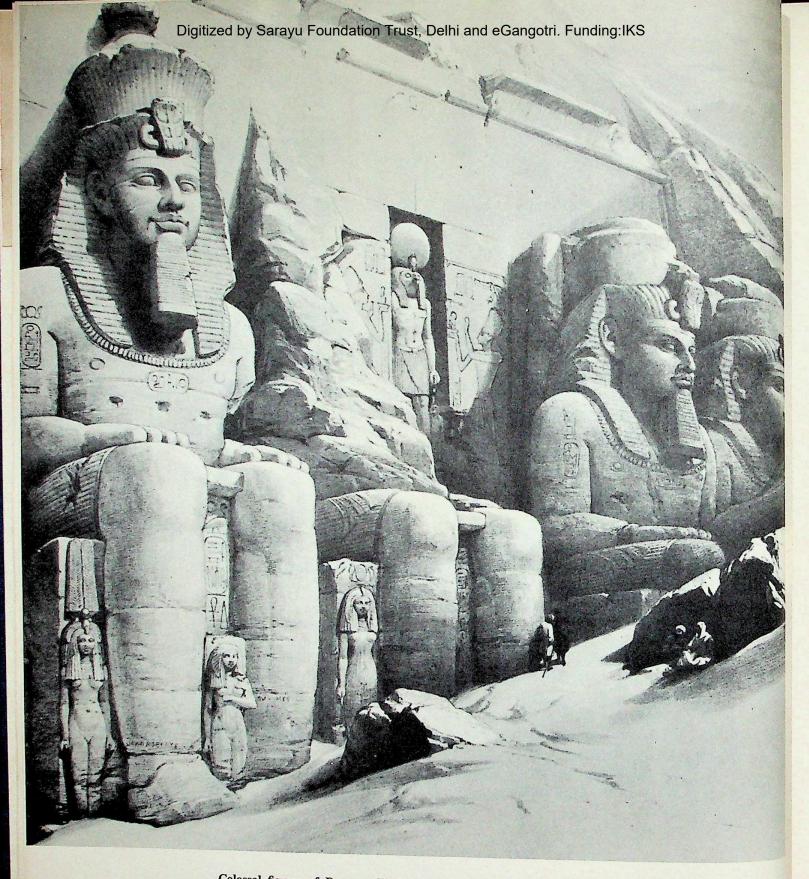
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Colossal figures of Rameses II, forming part of the architectural composition. The rock temple, Abu Simbel, completed by that Pharaoh, in the thirteenth century B.C. Reproduced by courtesy of the Mansell Collection.

CHAPTER ONE

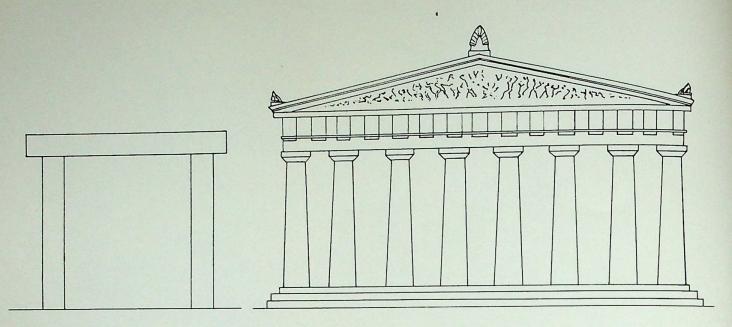
The Structural Inventions

Architecture tells the story of civilization in all parts of the world: in Europe, the Middle and Far East, Africa, and the ancient empires of Central and South America, the rise, maturity, decay and fall of peoples and powers, and the strength and weakness of national character are revealed by buildings. Cities and castles, palaces and temples, churches and mosques, country and town houses, extravagant and mean houses—all these buildings disclose the truth about the people who lived in them: their prosperity or poverty, their luxurious or temperate habits, the variety of their beliefs, the range of their pleasures, and their peaceful or warlike pursuits.

Buildings give nearly everything away about the people who used them when they were new and complete and a part of everyday life. For example, the ruins at Angkor, in Cambodia, gigantic in size, and buried for centuries in the jungle after the decadent Khmer civilization had disappeared, were originally monumental palaces and temples, erected by an oppressed slave caste for pleasure-loving aristocrats who devoted their time to dancing, bathing, love-making, theatrical entertainments and social trivialities, and for an ambitious, exacting priesthood practising a complex religion, too exalted to be concerned with the souls or welfare of the unprivileged.

The ruins of Greek temples show how their architects honoured the sense of sight as it had never been honoured before, and used their mastery of mathematics and masonry to correct all the natural defects of human vision, deliberately making level surfaces unlevel so they should appear perfectly level, and curving straight lines so they should appear to be perfectly straight.

Roman respect for law and order and the power of the Roman government are still evident from the ruins dotted over their former Empire, in Europe, Asia Minor and North Africa. The hard grandeur, luxury, infallible efficiency and brutish amusements of



Trabeated or post-and-lintel construction, showing application to a portico.

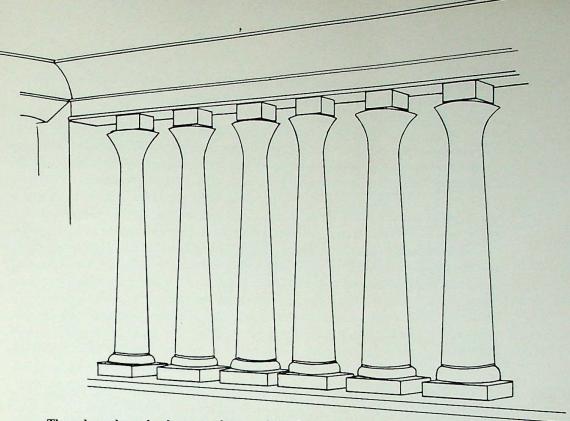
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a great military slave state may be read from the standardized architecture and decoration of those triumphal arches, public baths, temples, amphitheatres, villas and forts.

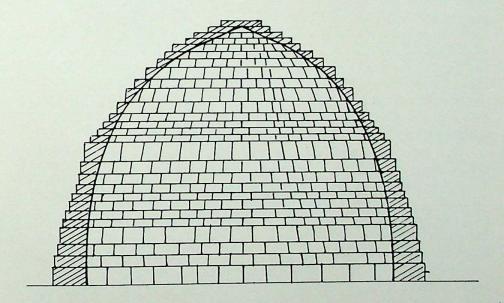
The changeless centuries of ancient Egyptian civilization, with the succession of godkings, the Pharaohs, the controlling religion, the consistent emphasis on life after death, and the national propensity for maintaining an inflexible tradition in thought and art, are recorded by the temples and tombs of the Nile Valley. The preoccupation of contemporary Western civilization with industry and commerce may be proclaimed to future generations by the towering office blocks of New York, London, and every modern European city.

With architecture our eyes become ears. Some buildings speak clearly, some stutter; others, like the great Gothic cathedrals, sing aloud; some tell a gay tale, like the Venetian palaces with their reflections swaying in the canals; some talk of modest comfort, like the eighteenth-century houses of England and North America; some say 'safety first!'—castles, forts, watch towers, which have naked strength, and nothing much else to recommend them. Until the invention of artillery, defence had the ascendancy over attack; so for centuries military architecture changed little; and the city wall was as protective as body armour and as hampering, for it restricted the expansion of the city as armour restricted the movements of the wearer.

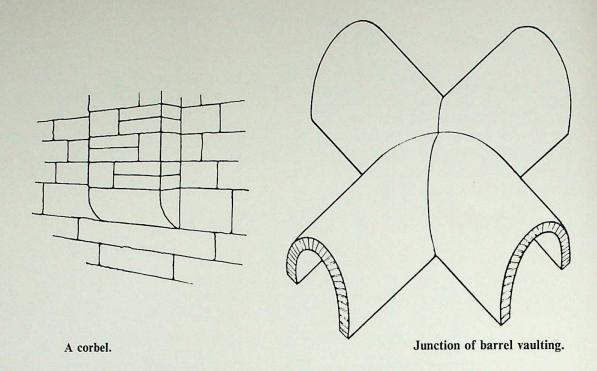
Despite national and religious wars, raids, conquests and deliberate destruction for religious or political motives, many buildings from the ancient world and the Middle Ages have survived. Man is the leading destroyer: climate alone, even when buildings are deserted, could not have done a fraction of the damage ordered and carried out by soldiers and priests. In Asia and Central and South America, quick-growing forests soon submerge buildings when men leave them.



The colonnade: a development of post-and-lintel construction.



The corbelled dome, formed by overlapping courses in rings, diminishing in diameter.



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How things were built is shown clearly enough by the remains of old structures or the character of new ones; why they were built is nearly always as obvious. Architecture is an art on a grand scale, and is rightly called 'the Mistress Art'. Some other arts, such as painting and sculpture, were formerly subsidiaries of architecture. Painting probably began with the decoration of cave walls, and later the walls of buildings, when smooth surfaces became available. Sculpture was often part of a building: natural forms were carved on or attached to stone walls, sometimes guarding a portal, like the man-headed winged bulls of Assyrian palaces, or the four seated figures of Rameses II, over sixty-five feet high, on the face of the great temple of Abu-Simbel, completed by that Egyptian Pharaoh in the thirteenth century B.C. Carved decoration could give depth to figures and scenes, could take sunlight and shadow into partnership; and the variation of surfaces, by the use of carved ornament and projecting mouldings, came to be related to the strength of sunlight, after many centuries of invention and experiment.

When some men stopped living in caves, they had to make shelters for themselves against strong sunlight, rain, snow, extremes of heat and cold, wild beasts and enemies. The earliest form of independent shelter, built and not excavated, was the hut, which was the result of a structural invention. The history of architecture is marked by three main structural inventions. Some were neglected for centuries, and then not fully used. The first and most elementary of them was made when two upright pieces of wood of the same length were driven into the ground to support a horizontal cross-piece, a beam, or lintel. This discovery, which seems obvious enough to us, was revolutionary, almost magical, twelve or fifteen thousand years ago, and was the beginning of post-and-lintel, post-andbeam, or trabeated architecture. (Trabs is Latin for beam.)

The simplest form of trabeated architecture may be seen in temples like Stonehenge

on Salisbury Plain, where a group of six trilithons—two upright stones supporting a horizontal stone—originally formed an inner circle; reproducing in a primitive way the massive post-and-lintel construction of an Egyptian temple. This constructional principle is still used throughout the world; for walls act as posts, carrying the beams which support floors and roofs. It has led to such supplementary inventions as the column, that most familiar of all architectural forms, and the colonnade, which is the use of columns in series: both originated in Egypt about 2500 B.C. The portico, or colonnaded space which forms an entrance to a building, came later.

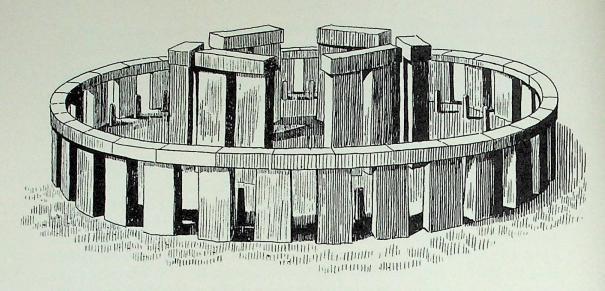
Another supplementary invention was made in Egypt about the same time as the colonnade, when windows were pierced in house walls on the first and second storeys. On upper floors, light was admitted through openings formed by rows of small columns, like miniature colonnades. In the settled civilization of ancient Egypt, which enjoyed long periods of internal security and immunity from war, the window could become more than a peep-hole in a fort or watch-tower, and as the room with a view became possible, houses enjoyed a new and closer relationship with their surroundings. In nearly all buildings walls consist of voids and solids, with solids usually predominating; and the size and treatment of windows and doors show whether the occupants were safe, prosperous, healthy and comfortable, or apprehensive, poor, unhealthy and miserable.

With post-and-lintel construction, builders learnt what could and could not be done with various materials; finding out by trial and error how much they could load on to posts or walls—for walls were the equivalent of continuous posts—how wide a gap a lintel or beam could bridge and how much it could carry without collapsing. The width of a doorway, or any opening in a wall, was limited by the strength of wood or stone; and such limitations remained in force until another structural invention overcame them.

Post-and-lintel architecture continued for centuries, because the forms it produced became familiar—and men resist changes—and were identified with sacred buildings and the idea of regal and civic dignity. Perhaps the chief reason for their persistence in Western architecture was the Greek invention of the three Orders, a system of design that determined the proportions of vertical and horizontal members and every detail of their mouldings and ornament. The Romans adopted those Orders, adding two more, and these have survived for over two thousand five hundred years, with twentieth-century variations, in places as far apart as Delhi and Washington.

The second structural invention was the arch, discovered perhaps when stone was first used for building domed huts, and the curved roof suggested a new shape. The arch was known in Egypt as early as 2900 B.C., and was familiar to the Greeks and Assyrians, but the constructional principle long remained undeveloped. No arches were used in the large buildings of Egypt, Greece or Assyria; though at Mycenæ stones were laid in horizontal courses, projecting as corbels on either side of an opening, one above the other, until they met to form a triangular space, relieving and distributing weight above a lintel. Such a relieving triangle appears above the doorway to the Treasury of Atreus at Mycenæ, and a corbelled dome roofs that building, formed by overlapping horizontal courses in rings, diminishing in diameter until the apex is reached, and covering a chamber nearly forty-nine feet in diameter.

The Structural Inventions



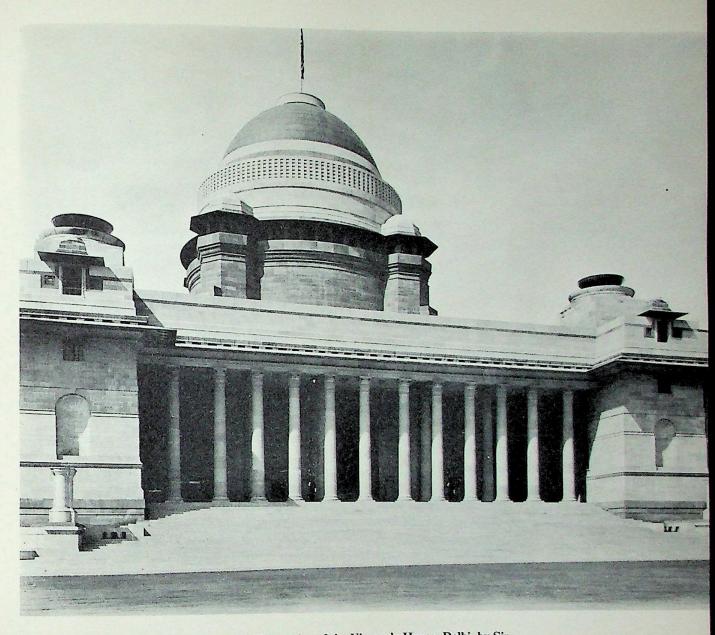
The temple of Stonehenge, Salisbury Plain, restored. This is a primitive application of post-and-lintel.

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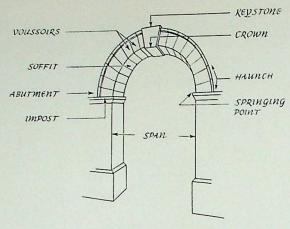
The structural powers of the rounded arch were not properly appreciated for many hundreds of years after the invention was made; it was a convenient method for roofing drains and tunnels, nothing more, and only came into general use among Etruscan builders, in North Italy, after the fifth or fourth century B.C.

Arcuated construction allowed large spaces to be spanned without intervening supports, and heavy masses of stone to be carried high into the air and their weight distributed downwards along the curves of the arches that supported them. When the semicircular arch was prolonged to form a roof over a space, it became a tunnel or barrel vault, and when two barrel vaults met at right angles, the lines of intersection, called groins, created a shape which may have suggested the use of pointed arches, even before they were introduced from the East. They appeared first in Europe in the South of France, which had been invaded by the Moslems during the first half of the eighth century A.D. The pointed arch allowed buildings to climb upwards, with arches piled on arches, and the weight of towers and spires to flow down to earth by a number of curved paths. Once the structural powers of the arch had been grasped, the roofing of great areas by domes, and the soaring spires of the Gothic cathedrals, were possibilities within reach, though centuries passed before such architectural dreams became realities.

The size of space that could be spanned by a beam depended on the strength of timber or stone; there was also a limit to the space that could be bridged by an arch or roofed by a dome; but that space was enlarged when Santa Sophia was built at Constantinople in the sixth century A.D., for although domes and pointed arches were first used extensively in the Middle East, the dynamic use of those structural features came from Western architects. In Oriental architecture, the dome is the splendid crown of a building; but the example of Santa Sophia inspired Moslem architects to use shallow domes with great



The classic orders in the twentieth century. The portico of the Viceroy's House, Delhi, by Sir Edwin Lutyens. Copyright Country Life.



The semicircular arch. 'An arch', wrote Leonardo da Vinci, 'is nothing other than a strength caused by two weaknesses; for the arch in buildings is made up of two segments of a circle, and each of these segments being in itself very weak desires to fall, and as the one withstands the downfall of the other the two weaknesses are converted into a single strength.' From Vol. II, Section XXXVIII, page 422 of The Notebooks of Leonardo da Vinci, arranged and translated by Edward McCurdy. London: Jonathan Cape, 1938.

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ingenuity in the mosques they built in the Middle Ages. Conical and pyramidal towers, elaborate roofs, pagodas and swelling domes rise all over the Oriental civilizations. The slender, pencil-shaped minaret, characteristic of Moslem architecture, preserves both in name and graceful form a memory of the great lighthouse of ancient Alexandria, the Pharos, built in the third century B.C.

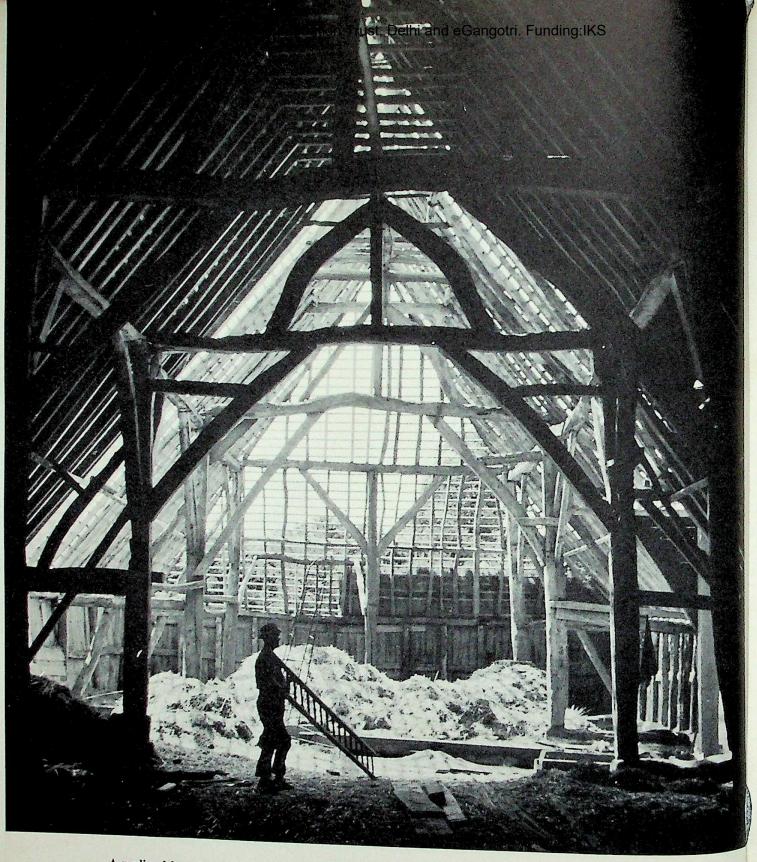
The third structural invention followed the large scale application of the cantilever principle. A cantilever is a beam, a horizontal support or elongated bracket, fixed at one end and free at the other, projecting from a vertical surface or an upright member. This semi-beam would act as a lever, and tilt the weight above the fixed end, unless that weight was heavy enough to hold it down. The length and supporting power of the cantilever may be controlled by anchoring the fixed end either by a great weight or by tying it down with anchor plates and ties. With the introduction of steel construction and reinforced concrete, floors could be cantilevered out from an internal frame, which relieved walls of their weight-bearing function, allowing them to be mere protective fabrics, hung from the free ends of the cantilevers like curtains. (They are called curtain walls.) Buildings which used to be like shellfish with thick, external supporting walls, now resemble vertebrates, with a hidden skeleton and a thin outer skin.

The reinforcing of concrete allows a greater variety of shapes than was possible with older methods of construction, and also makes it possible for buildings to rise to relatively enormous heights. The projecting roofs that jutted from Chinese and Japanese pagodas, temples and palaces, were supported by a system of wooden brackets and lever arms, which anticipated the use of the cantilever principle.

Climate and the materials available for building have influenced the way the three chief structural inventions have been used. Protection from sunlight, heat and cold, has, over

long periods of time, been more important than security. Wars and civil disturbances come and go; climate changes slowly, and the unending battle with weather has inspired inventions that have enriched architecture. The covered colonnade, for example, gives protection from the direct rays of a strong sun; the sloped or pitched roof deals effectively with rain and snow; and the vault and the thick wall have, in the past, defeated extremes of heat and cold, just as air-conditioning and central heating can now secure comfort in any climate.

These advances and improvements appear in their proper historical place in this story of architecture; but the nature and range of building materials must be examined first.



A medieval barn beside the parish church at Littlebourne, near Canterbury, Kent. This view, taken when the barn was being re-thatched, shows the internal structure, with the horizontal beams braced and supported, so that weight is distributed and the staunch timber skeleton takes up and absorbs all the strains and stresses. Timber was probably one of the first building materials, and where it was abundant the art of the joiner was highly the shipwright is very clearly shown by such timber structures as this barn. Copyright Peter Powell.

CHAPTER TWO

Building Materials

Wood, stone, bricks, tiles, cement and metal are the chief structural materials, and there are two principal ways of using them. The terms 'wet construction' and 'dry construction' are current today; but formerly 'wet' or 'dry' covered all known building methods. Dry construction now means assembling on a site pre-fabricated materials, such as concrete or timber, that have been prepared and finished elsewhere: in the past it meant building with solid substances, without cement binding, or using wood-framing, hung with small units like tiles. Thatched, slate or shingled roofs are examples of dry construction; so are stones piled dry on each other to form a domed hut, or blocks of dressed stone fashioned to fit exactly one against the other; but wattle, reeds and thin canes daubed with clay, are classed as wet construction, similarly brickwork, with bricks bedded either in lime or cement mortar to form a stable mass. Concrete poured into spaces between temporary wooden shuttering, which forms a mould and is removed after the concrete has set, is an example of modern wet construction.

The traditional building materials are wood, clay and stone. In the past, metals like bronze and iron were used only in conjunction with other materials for some specialized function, as in the making of hinges, bolts, window bars, railings, balustrades, firebacks or grate bars. Lead was used for plumbing, and for the thin bars framing the diamond-shaped panes when glazed windows were reintroduced in the late fourteenth century. The term 'plumber and glazier' still survives; it was the plumber's job to deal with all uses of lead, for which the Latin word is *plumbum*. Cast and wrought iron began to be used for pillars and beams in warehouses in the late eighteenth century, and in houses for the framework of verandas; but no structure wholly depended on metal members until the nineteenth century, when large buildings like the Crystal Palace were made of pre-fabricated units of cast and wrought iron.

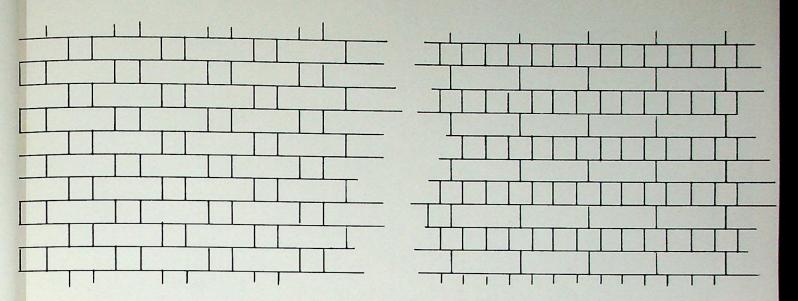
Materials used with the three structural inventions have affected, though they have not controlled, the character of architecture, and climate has enlarged or limited their possibilities, allowing some forms, like the brick wall and the semicircular and egg-shaped dome, to be developed. In Egypt the Nile mud could be made into blocks, mixed with chopped straw, and quickly baked into bricks by the sun's heat. In Assyria, the shortage of timber and the plasticity of the Mesopotamian mud encouraged an early use of the dome. Timber was almost as scarce in Egypt, but there the use of brick and stone was stimulated by the inexhaustible Nile mud, and the abundant supplies of granite, limestone and sandstone, which gave the Egyptians the finest and most varied material for masonry and sculpture.

Where timber was abundant, an architecture of wood evolved forms that were ultimately copied in more permanent materials. In India, Burma, China and Japan, as civilization advanced, the art of preparing and framing timber to form the structural skeleton of a building was perfected, and this system of joinery has, with characteristic national and regional variations, evolved wherever there were large forests. The properties of various timbers have challenged and improved the skill of woodworkers. For example, teak, which grows in India, Burma, Siam, Cambodia and the Indonesian islands, is exceedingly hard: so hard indeed that in some countries joiners and carpenters used to demand additional pay when they had to use it, because their tools became dulled and blunted. This excessive hardness, combined with great durability and resistance to fire, gave long life to teak-built

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In large tracts of Asia, Europe and America, timber was probably the first building material. The simplest kind of wooden hall, really a greatly enlarged hut, was the fore-runner of the fine timber houses and churches built in the Scandinavian countries during the Middle Ages, as the log cabin of the first European settlers in North America was the forerunner of the commodious timber-framed houses of the eighteenth century, with their outer walls formed of overlapping horizontal boards, painted white. Although by comparison with stone and brick, wood has a limited life, hard woods like teak and oak can last for many centuries. Even when the art of building in wrought stone had been mastered, and the mason's craft had reached the Greek level of accomplishment, wood and clay were never abandoned, and were valued for their own special properties and secondary uses.

The sun-baked bricks of ancient Egypt were bedded in wet mud, so the whole wall, dried out by the sun's heat, was fused into a strong mass of one material. When cement was used for binding bricks together, the cementing had to be as strong as the bricks, so the wall had stability. Originally the brick was thin and square, and was developed from the sun-dried mud block and the baked tile. The Romans were the first builders to produce a cement which was as strong as the bricks or stone blocks bedded in it; and this was made by mixing lime with pozzolana, a volcanic earth, which lay in thick deposits in the Alban Hills and at Naples. No ordinary clay or lime mortar could make joints as strong as pozzolana cement, and this material made the construction of large scale vaults and domes possible. Sun-dried mud blocks were used for the substance of a wall, and could support weight; baked tiles were used for facing walls, to cover rough concrete or rubble, and also as flat horizontal bonding courses through a concrete wall. Rubble walls consist of irregular stones, thinly bedded in mortar. Concrete is made of cement, sand, crushed stone, pounded



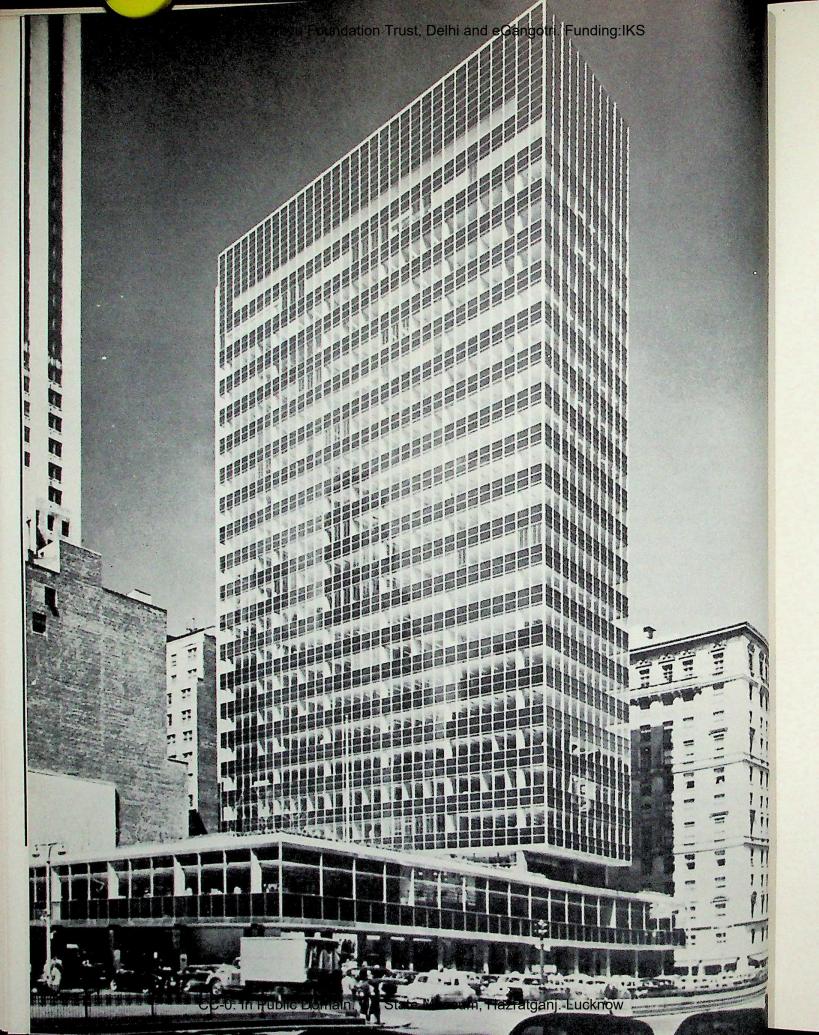
Two forms of brickwork bonding: left, English; right, Dutch.

tile or brick, mixed with water. Both bricks and wrought stone blocks are laid in horizontal rows called courses.

The art of glazing bricks was next discovered. Brilliant colours were used for the glazed brickwork in Assyrian palaces; and in the ancient Persian Empire, the palaces of Xerxes and Ataxerxes at Susa had bands of such bricks, depicting lions and archers. This type of external decoration had a permanent freshness, and was not worn down by time, like the carved stone decoration on the temples of Egypt, India and Cambodia. The use of coloured glazed tiles spread throughout the Middle and Far East, and the domes and roofs of Oriental buildings glittered with gold and many-hued patterns. These were refinements of the basic material; for the manufacture of bricks led to the invention of such supplementary processes as surface glazing, by which they became hard, smooth, and highly decorative.

The forms worked out in clay or timber, or suggested by the growth of plants, were often imitated by early builders when they began to use stone. The stone columns of Egyptian temples were carved to imitate posts which, in more primitive buildings, were made of bunches of papyrus stems. Stone was regarded as a precious material, that increased the scale of buildings, giving them a new, durable dignity.

The Egyptians, as mentioned in the previous section, had granite, limestone and sandstone; the Greeks had Pentelic marble, from quarries at Mount Pentelicus, which allowed them to bring masonry to an unequalled perfection. This marble had a pale ivory translucent surface, inviting masons to produce sharply defined forms; and that sharp definition of horizontal and vertical lines could easily have given the temples and porticoes a rigidity of aspect, if the Greeks, with their sensitive vision, had not modified the effect by taking immense pains to make optical corrections, which softened the hard lines of the material Building Materials



Steel, concrete, glass and the third structural invention have once again made the tower a vital element in the new Western architecture of the twentieth century. The Lever Building, Park Avenue, New York, designed by Skidmore, Owings, and Merrill. Reproduced by permission of United States Information Service.

and adjusted the natural illusions produced by the human eye. From Lydia and Caria, in Anatolia, the Greeks quarried a fine white marble for the temples and palaces of their Asiatic possessions.

There was no marble in Crete, but excellent limestone was abundant, and in the palaces of the Minoan civilization this was used in conjunction with timber, which was also plentiful, and limestone masonry was set in courses with a lime mortar.

The Romans used white and coloured marbles, and a limestone called travertine, cream or brown in colour and strong enough to carry great weights. The so-called onyx marble of Algeria, a translucent material, clouded yellow and brown, was used in the buildings of Carthage and Rome. Good building stone was available in many of the Roman provinces, suitable for the ambitious, monumental architecture of the Empire.

In Mesopotamia, stone was as scarce as timber; in Persia, while limestone was available, the difficulty of transporting it from quarries in the steep hills of the country, localized and limited its use. A fine white marble was quarried in India, and the material for the Taj Mahal at Agra probably came from Makrana in Rajputana. Spain, France and Belgium yielded a great diversity of marbles; from Dorsetshire came the Purbeck marble, used in many of the English medieval cathedrals and abbey churches.

Although glass was invented about 2000 B.C., probably in Syria, it was used almost exclusively for vessels and decoration; apart from glazed tiles and inlays of coloured glass in cement, no attempt was made to take advantage of its properties in building. The Romans developed a non-transparent window glass, but not before the beginning of the Christian era. Small, thick, translucent panes were cast, of a greenish or bluish tinge, which imparted a sombre and rather depressing quality to the daylight admitted through them. In the ancient Egyptian and Greek civilizations the window was an unglazed though not an unprotected opening. Fine lattice screens shielded rooms from the glare of the sun, and in the East, thin panels of marble pierced with elaborate patterns filled window openings. Neither Roman nor medieval glass-makers were able to produce large panes, but the Gothic builders progressively increased the glazed areas in their great churches, until by the end of the Middle Ages, the church was a vast lantern with masses of coloured glass held in place by a slender, intricate framework of carved and moulded stone.

The Romans had used thin-ground alabaster and mica; oiled linen and parchment let subdued light into medieval houses and wicker lattices let in cold air as well; paper was sometimes used in the East; as late as the sixteenth and seventeenth centuries, in the churches of Goa, instead of glass, Portuguese architects employed mother-of-pearl, a

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substance which softened the intense glare of the Indian sun. When glass-makers did at last achieve transparency, the effect on architectural design was revolutionary. The window in the Northern European countries became a dominating feature, eating away wall surfaces; a popular saying about one of the great English houses of the late sixteenth century, was 'Hardwick Hall, more glass than wall'. Windows never expanded so much in Southern Europe, North Africa, or the Middle and Far East, because the light was too strong.

Glass manufacture progressed and the quality of glass improved, until in the late seventeenth century plate glass was produced in France, and transparency without distortion became possible. Today glass has become a structural material, incorporated in the fabric of a building, not merely filling apertures with transparent sheets, but also, in various forms, providing a coloured wall surface.

The three materials that have come together during the growth of the new Western architecture of our century are steel, concrete and glass. They give substance to the third structural invention which could not have been effectively applied without steel and concrete.

Reinforced concrete, also called ferro-concrete, was introduced in the second half of the nineteenth century. Rods of iron are used to strengthen the concrete, an invention attributed to a French gardener, named Joseph Monier, though about the same time other inventors were working on the system.

When steel construction was developed in the 1880s, another revolutionary change followed: the tall building—the 'skyscraper'—became possible, dwarfing the towers and spires and domes which had hitherto satisfied men's ambition to build upwards. Cities could now expand vertically as well as horizontally; a small town could be compressed into a single tower, and ten to fifteen thousand people securely supported by a steel skeleton with concrete floors and protected by an outer skin of glass and aluminium.

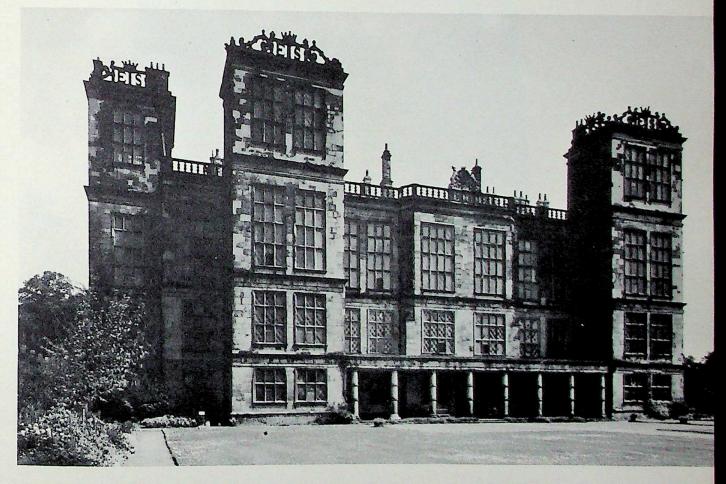
This structural revolution, which followed the large scale employment of reinforced concrete and steel, has led to the use of light, ductile materials like aluminium alloys, a huge range of plastics, and wood, treated in new ways in association with plastic sheets. Industrially-produced materials are prepared and finished away from the site, and are delivered to it and then assembled. This has changed the whole character of big buildings and building methods too. An office block, a school, a hospital or a group of multi-storeyed flats, come off an assembly line, like cars in a factory. They are not built, brick by brick and stone by stone on the spot by men with special skills; the skills have been mechanized; the structure, down to the last hinge of a door, has been unalterably settled on paper far in advance. There is no room for, or remote chance of, the architect having second thoughts, as the cathedral builders of the Middle Ages had second thoughts, and could make additions or modifications to their design as work went on.

The nature of modern industrial materials gives modern structures a predictable life. The Egyptian, Greek, Roman and medieval architects built not only for their own day and age, but for the future. Today, we can calculate that an office block may have a productive economic life of thirty-five to forty years, just as an ocean-going liner has a predictable economic life. After that is over, and the cost of maintenance and repairs increases, the building or the ship no longer earns enough money to pay the landlords or the ship-

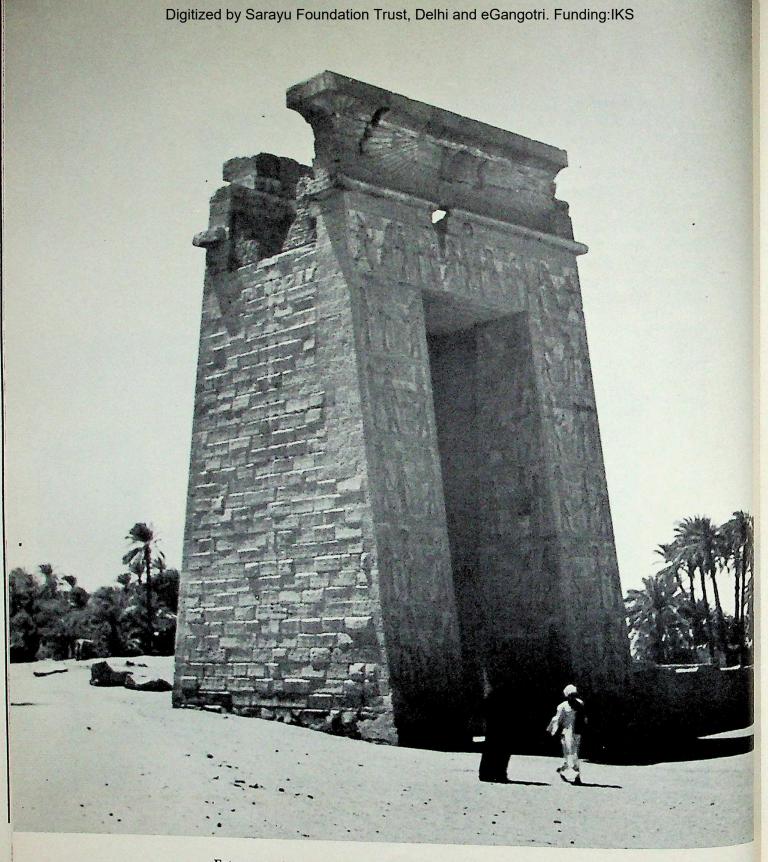
ARCHITECTURE

owners, and is scrapped. This economic outlook is encouraged by the fact that industrial materials gain nothing from the passage of time: they do not grow mellow and weathered, though they can be renewed piecemeal without glaring patches of renovation showing, and they can be maintained to make the best use of their span of life. We do not yet know what the real as opposed to the economic length of life is for concrete buildings, though we do know that the concrete the Romans used was almost indestructible by time.

Materials have thus changed not only the character of architectural design, but the attitude of men towards architecture. In the first chapter, we said that the preoccupation of modern Western civilization with industry and commerce would be proclaimed to the future by the huge office blocks of American and European cities; but they may not survive our contemporary respect for economic values. So this may be the first civilization that leaves no architectural record for the future to read.



Hardwick Hall, Derbyshire, built A.D. 1590-97. Windows had eaten away the wall surface, following improvements in the manufacture and use of glass. *National Buildings Record*.



Entrance to the court in the temple of Ammon, Luxor, showing the batter, the inclined face, of the external wall. Photograph by Alan Deller.

CHAPTER THREE

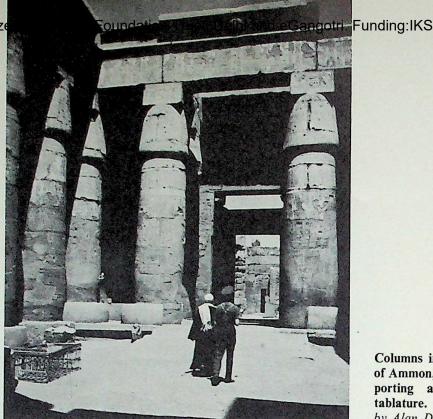
The Example of Egypt

When men realized that there was more in the art of building than making weather-proof shelters that would stand up and stay up, they became conscious of new creative powers; and this consciousness, from which architecture arose, developed originally in the valleys of the Nile and the Tigris. The mud of those great rivers, fabulously fertile, gave such abundant crops that a surplus of wealth and leisure became available for work that was not merely utilitarian; and that mud also supplied an inexhaustible building material.

The awareness of the new powers inspired the god-kings, the Pharaohs, of ancient Egypt to build on a grand scale: tombs, temples and palaces, in that order of importance. As Egyptian architecture matured, tombs became more impressive in size and design than buildings that served the living. This preoccupation with an after-life left a permanent mark on Egyptian art and even before the Pyramids were built, tombs had become spacious and magnificent, with the tomb-chamber concealed in the heart of a vast mass of brickwork, two or three hundred feet long and about one hundred and fifty wide. This mastaba type of tomb was enlarged by successive skins of sloping brickwork, built at a steep angle, and the early step-pyramids were really gigantic mastabas, and from these the true pyramid form evolved. The Great Pyramid at Gizeh, built by the Pharaoh Khufu—or Cheops—who began his reign in 2000 B.C., was 482 feet high, the base covered thirteen acres, and the surface was cased with smooth, white, polished stone. The cost in labour, time and material drank up much of the surplus wealth of the country, and Herodotus, the Greek historian, writing over two thousand four hundred years later, mentions a tradition that 100,000 labourers were employed for twenty years on the work.

The Pyramids were not solitary monuments: each had a temple on the eastern side, dedicated to the buried Pharaoh, and pyramid and temple were surrounded by paved, walled courts, resembling a cathedral precinct with its subsidiary buildings. Within these

Digitize



Columns in the temple of Ammon, Luxor, supporting a plain en-

tablature. Photograph by Alan Deller.

ARCHITECTURE

mountains of brick and stone were one or two small chambers, one for the elaborately painted sarcophagus containing the embalmed body of the Pharaoh. The intimidating bulk and the carefully hidden and blocked entrances to the passages leading to the burial chambers, were designed to defeat looters; they remained unviolated down to the time when Egypt became a Roman province after Cleopatra, the last independent Egyptian monarch, had committed suicide. Today, the Pyramids, stripped of their stone skins, robbed of their treasures, but unforgettably majestic, have set the pace for commemorating death with pride and grandeur for forty-eight centuries.

The impressiveness of tombs and temples was increased by the grand approach. The way to the great temple of Ammon at Karnak was through an avenue of sphinxes, which linked it with the temple of Ammon at Luxor, and established a form for the grand approach that has lasted for over five thousand years. Today, the broad way to the mausoleum of Kemal Attaturk at Ankara is guarded by sculptured lions, crouching in pairs throughout its length. The ancient British temple at Avebury in Wiltshire was approached by two stone avenues, from Overton Hill and Beckhampton, through long lines of regularly placed stones. Once an idea, such as the sculpture-flanked avenue, has been given architectural expression, it persists for centuries, re-emerging from time to time in different forms.

The Egyptian invention of the column has persisted, with lasting effect upon the character of architecture. The monolithic column, hewn from a single block of stone, was originally copied from the wooden tent pole, and generally divided into three unequal parts, of which the shaft was the longest, rising from a base, with the shaped and ornamented capital at the top. No base was really needed for a stone column—bedded firmly in the ground by its own bulk and weight, its stability was assured—but because wooden





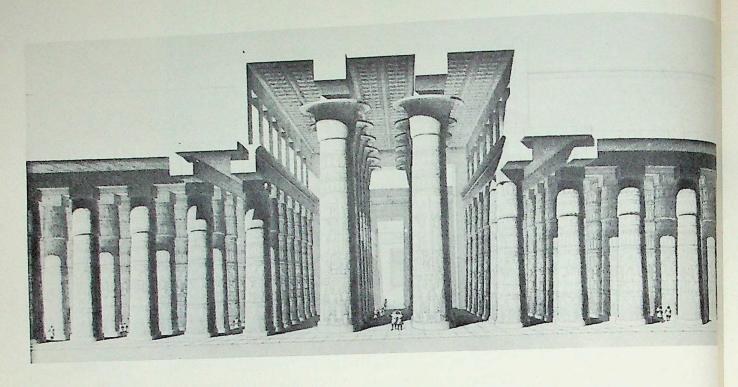
Restoration of the temple of Ammon, Dêr-el-Bahari, showing the lay-out of the approaches and courts. By courtesy of the Metropolitan Museum of Art, New York.

columns had rested on low, circular stone blocks, they were often perpetuated in stone columns.

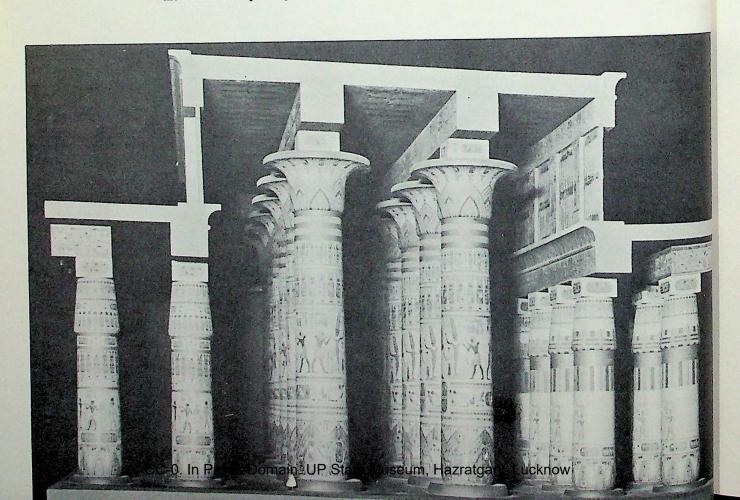
Builders have always continued to use familiar shapes, even when they were no longer structurally necessary. The base on the stone column is one example of such loyalty to the familiar; another is the slope or 'batter' on a wall or a pylon with the gorge or coved cornice at the top. The mud brick walls of Egyptian buildings were originally sloped or 'battered' so the base of the wall was thicker than the top, for this broadened base gave greater stability: a structural necessity when sun-baked mud brick was used, though not when stone replaced brick; but the form remained, and battered walls and the flanking pylons or towers of gateways became typical of Egyptian architecture, the wall sloping up to the moulded cornice whose form was derived, like the capitals of some Egyptian columns, from the graceful curves of the palm leaf.

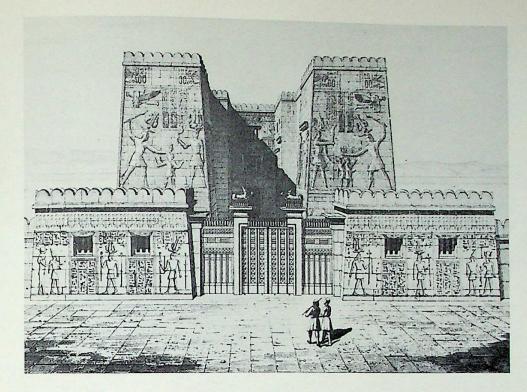
The custom of tying flowers and leaves to the wooden posts of early buildings was probably the origin of the ornamental capitals of stone columns, for papyrus blossom and lotus buds as well as palm leaves were carved in stone, and below such decoration there was a band, separating the capital from the shaft, representing the cord that had bound flowers and leaves to the wooden prototype. Decorative forms in stone very often recall some forgotten function worked out in an impermanent material: bundles of reeds, tied together in rolls, may well have originated the vertical convex form of decoration on columns known as reeding. This is not guesswork, for early Egyptian paintings illustrate structures when wood and clay-daubed reeds were used, and show posts with projections at the top which are the obvious ancestors of the later stone columns with their swelling or bell-like capitals Egyptian architects were masterly manipulators of the play of light and shade; devising mouldings which cast deep bands of shadow to give life and movement to surfaces.

The Example of Egypt



Above: Restoration of the great hypostyle hall of the temple of Ammon, Karnak. Compare the smaller columns with those in the temple of Ammon, Luxor, page 20. After Chipiez. Below: A model of the temple. Reproduced by courtesy of the Metropolitan Museum of Art, New York.



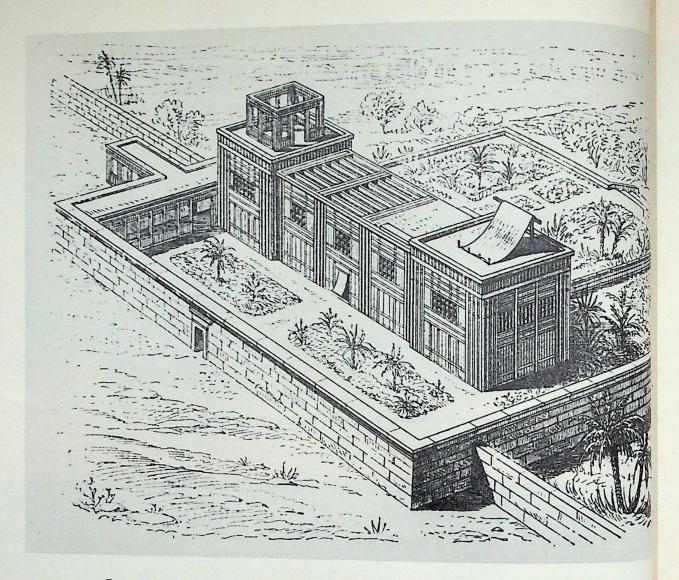


The Example of Egypt

The pavilion of Medinet-Abou, at Thebes, restored. After Chipiez.

Each nation establishes a tradition of design, incorporating new ideas and inventions as time passes, amplifying and enriching the stock of architectural knowledge, until decadence is revealed by weakness of execution and the indolent, scamped repetition of tried and trusted forms, so there is no longer a living tradition of design: only a feeble memory. Egypt established a tradition of design, and in doing so contributed more to architectural knowledge than any other nation. The proportions of columns, and their arrangement became basic factors in architecture, and a nation of mathematicians, astronomers and artists, where art and science were directed and guarded by an educated priesthood, gave order, precision, regularity and symmetry to architectural design, so the relationship of horizontal and vertical elements in building could be harmonious, pleasing and reassuring to the eye, because everything built was stable and was seen to be stable. The Egyptians invented such shapes as the obelisk; while knowing of the vault, the arch and the dome, they did not develop those forms, preferring to remain faithful to post-and-lintel construction.

When their architecture had matured, they shut the door on change, continuing, from generation to generation, century after century, for three thousand years, the same style, the same conventions for sculpture, ornament and decoration. This rigid tradition was



Restoration of a timber-built Egyptian house, surrounded by a walled garden. After Chipiez.

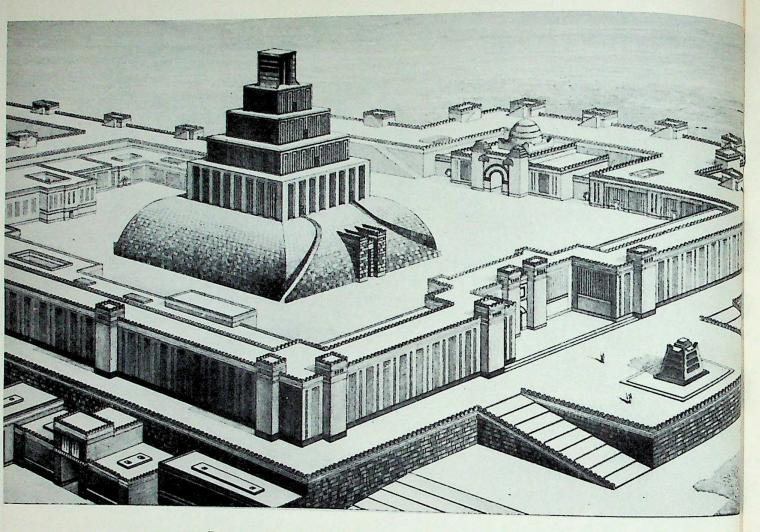
broken for a short time by one Pharaoh, Amenhotep IV, or Ikhnaton, who reigned for seventeen years, from 1375 to 1358 B.C. He had been described as the first individual in human history: an unworldly, intellectual man, who founded a new religion, and by neglecting the practical affairs of government managed to lose large parts of the Egyptian Empire in Syria. After his death the old religion was restored, his tomb wrecked, every memory of his reforms obliterated, and the brief release from the inflexible limitations of custom forgotten.

The genius of Egyptian architects was dedicated to the designing of tombs and temples. The latter, vast in size and complex in plan, consisted of a succession of courts and lofty columned halls, some roofed, some open to the sky, leading to an inner, secret holy place. The courts were set out on a central axis, pointing to the sunrise. The grand approach through avenues of sculptured figures led to the outer gates, where a pair of obelisks stood—monoliths incised with hieroglyphics, the sacred characters of the ancient Egyptian language. Colossal figures of gods and kings were incorporated in the design of these buildings, and although they have been ravaged by time, other destructive agents were intermittently active, for statues and temples raised in honour of some Pharaoh would occasionally be defaced or demolished by a jealous successor.

The royal palaces and the houses of high officials were spacious, but often impermanent, built usually of brick and timber, with their courts and colonnades, gardens, pools and subsidiary buildings surrounded by thick walls. The houses were two or three storeys in height, with windows lighting the rooms, and walls, ceilings and floors decorated with repetitive patterns or paintings of flowers and plants, birds, animals, gods and men, the flow of traffic on the Nile, the excitements of hunting, fishing and fighting—subjects and scenes from life, portrayed in a flat, conventional style, without perspective, but with great liveliness. The two great luxuries of life were water and shade: ponds or a central tank supplied the first, colonnades the second. The importance of open space in the form of a central court or a surrounding garden was recognized, even in towns.

The Egyptian town, square or rectangular in plan, had a regular pattern of streets, with clearly defined quarters for different social classes; the whole protected by strong walls. Unlike the tomb and the temple with its adjacent buildings, the town was not a grand architectural conception; it was just a place for living in, and as such had far less importance, for everyday life was less important than death and religion. But life had its graces. In Egypt men learned how to live tidily outside their houses as well as inside. The insanitary mess and litter outside the huts and caves of primitive people had been banished by the garden, the relationship of the garden to architecture recognized and established: a relationship honoured and amplified by every subsequent civilization, abandoned only in periods of war and social disaster though never wholly forgotten, and always re-emerging after the dark age had passed.

The Example of Egypt



Reconstruction of an Assyrian temple, with a central ziggurat, enclosed courts and outbuildings. After Chipiez.

CHAPTER FOUR

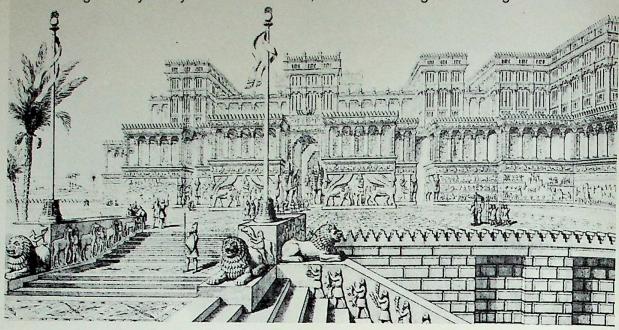
Babylonia and Assyria

The Sumerians, with Ur as their chief city, founded a civilization in Mesopotamia, perhaps as early as 4000 B.C. The Babylonian Empire, which was derived from this Sumerian civilization, was transformed into an aggressive power by Semitic invaders from Arabia, and lasted until the last quarter of the thirteenth century B.C., and was then conquered and absorbed by the Assyrian Empire, which survived until the sixth century B.C., when in turn it was conquered and absorbed by the Persian Empire.

Town planning was known to the Babylonians, and their chief city on the Euphrates had a regular pattern of streets. Herodotus, who went to Babylon about 450 B.C., wrote an account of what he actually saw and heard of its former glories. From corner to corner, the city, which was square in plan, was divided by the Euphrates into two approximately equal triangles. The walls were of brick, 340 feet high and 90 feet thick according to Herodotus; the streets were apparently laid out on a grid plan, with houses rising to three or four storeys. His account of the city's size is exaggerated, but the description of what he saw is probably as good as anything a modern traveller would write after wandering about in a huge, strange place, without a street map. Babylon was built, destroyed and rebuilt, despite its apparently impregnable walls. Within their circuit were palaces and temples; a broad, straight road running north and south, linked the palaces with the temples, a processional way, which, like the grand approach to temples, became a feature of later city planning. There were open planted spaces, good drainage, abundant water—for the river flowed through the city—and the famous 'hanging gardens' overlooking the walls, for the impressiveness of building on many different levels had been discovered.

The Sumerians invented the ziggurat, the lofty temple tower of several storeys, each decreasing in area as the tower rose. In Sumer each town had one of these gigantic towers in the centre; from the summit the gods could descend to earth and the earthly kings

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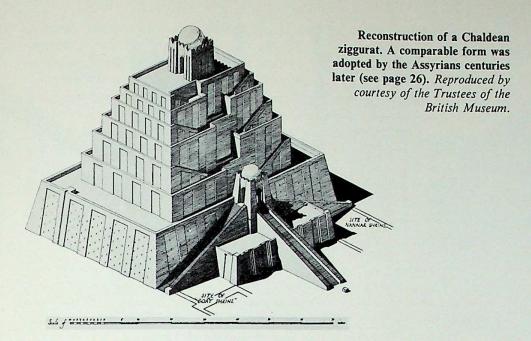


Restoration of an Assyrian palace, showing the use of colonnades and varying levels. From Layard's Nineveh and Babylon.

ARCHITECTURE

could ascend to heaven. The temple thus became the ever-visible link between heaven and earth. To build high has always been a human ambition, and the idea of a tower that would reach heaven, recorded in the eleventh chapter of Genesis, was current throughout Sumer and the Babylonian Empire that followed; and the ziggurat, the stepped tower, was the most conspicuous contribution of the early Middle Eastern civilizations to architectural form, and also the forerunner of the zoned American skyscrapers of the present century. The temple was a highly developed complex of buildings, with the main structure standing in a large open space, planted with trees and flowers, surrounded by houses for the priests, store-chambers and pens for animals awaiting sacrifice.

Temples and palaces were the most outstanding buildings. Their walls, sculptured in light relief, showed details of religious and secular life, and the ornamental glazed tiles, used so frequently for surfaces, gave proof of great artistic and technical ability. The Babylonians built large, lavishly decorated palaces, on different levels, approached by flights of steps; for they recognized the impressive dignity of steps, and the part they could play in social and religious ceremonies. Long flights of steps probably suggested the use of tiers for seats, rising about a semicircular or circular space, so the idea of a stage and an arena for spectacles was evolved, and later brought to graceful perfection in the open-air Greek theatre. Sculptured figures of men, animals and winged, hybrid monsters guarded the portals of palaces and temples; these tall, brick-built structures glistened with glazed surface tiles, in various colours and patterns, and a lush vulgarity of form and decoration occasionally disfigured the extravagant homes of the tyrants who ran and ruled an aggressive military and commercial slave state. Such buildings were quite different in character which suggested a coarse appetite for luxury.

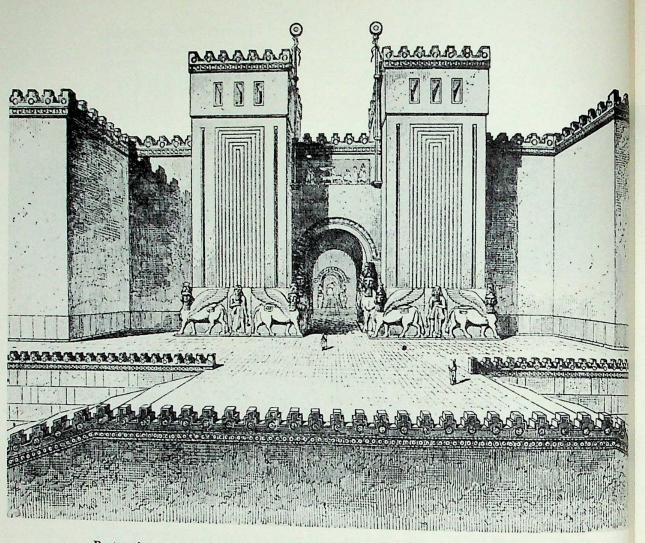


The Assyrian civilization that followed the Babylonian was also technically accomplished. The Assyrians built for strength and display: 'keeping up with the Joneses' is a very old impulse judging by examples of rivalry between rich men expressed in architecture. Their rulers were boastfully arrogant, and a streak of bestial cruelty ran through the national character, for some of the pictorial sculpture on the walls of royal palaces shows prisoners of war being tortured and flayed alive. A palace was often like a castle in bulk and strength. The brick or stone shields, square or rectangular in shape with slits between to allow archers to shoot their arrows, known as battlements, protected the tops of palace and city walls, and towers: a form of fortification that was adopted for all military buildings.

The Assyrians used the arch for roofing drains; they also used domes, rounded and conical. Crouching lions or sphinxes formed the bases of columns, which were lighter and more fantastic in character than their grave Egyptian counterparts. Airy colonnades extended from the main blocks of the palaces. Gateways flanked by guard towers, with gates swinging on bronze pivots socketed in stone, protected the entrances to the courts of palaces and temples. Like the Egyptians, Babylonian and Assyrian architects grouped columns to secure symmetrical effects. They used formalized ornament, and certain patterns of leaves, flowers and geometrical motifs spread over the whole of Mesopotamia, reaching westwards to Anatolia where the Hittite or Hatti Empire was for a relatively short time established, lasting from the sixteenth to the thirteenth century B.C.

The Hittite and Egyptian Empires collided, and their battle-ground was Syria, for in the fifteenth century B.C., the Egyptian Empire extended to Anatolia. Little remains of Hittite architecture: the capital city of Hattosas in Cappadocia vanished. The Hittite Empire was forgotten, and the Greeks who visited the country some centuries later could not identify the builders of the ruined cities and palaces or the makers of the huge cliff

Babylonia and Assyria



Restoration of the palace of Sargon, with towers and walls topped by battlements, and the entrance guarded by colossal figures of man-headed, winged bulls. After Chipiez.

carvings. The sculpture and ornament that survives has a virile barbaric character, influenced a little by Babylonian art, but with a boisterous life of its own. Nothing was passed on to the architecture of Europe or Asia by this short-lived Empire.

A civilization that has never been forgotten was established in Palestine by the Israelites, consisting of twelve Hebrew tribes, united by a powerful religion, which enabled them to survive periodic conquest, and to preserve their culture after their country had become a Roman province and they were eventually dispersed. Little is left of their architecture, but the Bible, in Kings I, chapters 6 and 7, and Chronicles II, chapters 3 and 4, gives a detailed description of the great Temple at Jerusalem, begun by King Solomon about 1012 B.C.: a structure that was certainly influenced by the temples of Egypt and Babylonia. Stone, prepared away from the site, cedar, fir and olive wood were used, and many of the walls were overlaid with gold plates. Hiram, a skilled brass-worker from Tyre, was employed to cast pillars and other brass ornaments, and the twin columns of Jachin and Boaz in the porch of the Temple had 'lily work' on the top, presumably on the capitals. This monumental structure, with its three courts and porches and 'hewed stones, sawed with saws, within and without, even from the foundation unto the coping' stood on a large natural platform, partly built up on one side. That site is now partly occupied by the Dome of the Rock, the so-called Mosque of Omar, built in A.D. 688.

Few traces of the ancient architecture of the Israelites have come down to us. Romans, Saracens and Crusaders have marched and counter-marched and fought over the country, using old buildings as quarries for new work, or destroying them for war-time needs, or to assert the dominance of some later religion.

Babylonia and Assyria



The Gate of the Lions, Mycenæ. The sculptured triangular slab of limestone is probably the earliest use of sculpture in relation to an architectural feature in Europe. The rampant lions are separated by a small column, tapering downwards like the type used in Minoan architecture.

CHAPTER FIVE

The Minoan World and the Mycenæan Empire

A civilization based on sea power flourished peacefully in the eastern Mediterranean in the fertile island of Crete, from about 2600 B.C. to 1400 B.C., and was followed by a similar though less peaceful and polished civilization on the Greek mainland and the islands of the Aegean sea, which lasted until about 1125 B.C. Both produced a characteristic architecture, though the later civilization, the Mycenæan, was limited by defensive needs which had never troubled the islanders of Crete. Knossos, the chief centre of social life and government in Crete, lay within four miles of the sea in a hollow in the hills, and was never fortified, from the time when it was a Neolithic settlement, whose inhabitants lived a simple agricultural life, to the days of its wealth and splendour. New knowledge of materials and new skills for using them gradually gave greater variety and complexity to life; architecture emerged from primitive building; other towns grew up—Phaestos, Mallia, Mochlos, Pseira and Gournia.

At Knossos the remains of a palace have been excavated, so vast in extent that it was virtually a city, so intricate in plan that it has been identified with the Labyrinth of Minos, the semi-legendary priest-king of Crete; thus the term Minoan is used to describe the culture of that ancient maritime civilization. The king was not isolated from his people, remote and unapproachable, but lived in the centre of the chief city. His palace was the heart of Knossos. Innumerable dwellings on the surrounding hills housed the population, which has been estimated at 80,000 at the height of the city's power and prosperity. There were no great temples or tombs, only a few small shrines, and the Minoans were not serfs, tyrannically disciplined by priests and kings. Comparatively few representations of either gods or priests are found in Minoan art, which was free and independent of any religious control—perhaps the first free art in the world—and although religious symbols abound, the subjects modelled in low relief and painted

on the plastered walls of rooms are concerned with the daily life and occupations of the people.

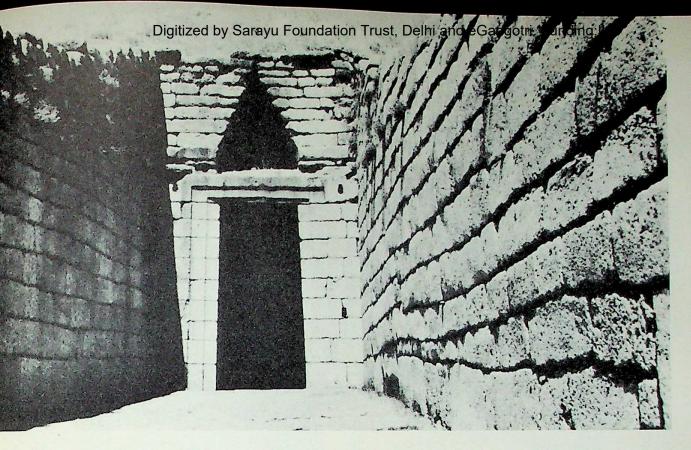
In the palace at Knossos there were halls with columns of wood, tapering down from the capital to the base, a form suitable for timber construction, but inappropriate and sometimes structurally unsound when copied in stone, as it was later. There were porticoes with double rows of columns, broad flights of stairs, windows with frames and strong mullions, or upright members, to support the overhead weight and resist the pressure of the surrounding masonry, and efficient plumbing brought running water to palace apartments and houses, which were equipped with bathrooms and water-closets. There was no marble in Crete, but abundant supplies of limestone, gypsum for slabs, and brick-earth were available, while timber was plentiful. Post-and-lintel construction was used, with heavy timbers for floors and roofs, beams with a wide span being supported by a central column. Thin slabs of gypsum, laid in mortar, were used for partition walls.

Minoan architecture, which was largely domestic, has a strikingly modern air, possibly because it was developed in places that never expected to be attacked. Protected by an efficient navy, the Minoan world existed in untroubled and unthreatened isolation for at least twelve centuries, a period far longer than the life of the Roman Empire or the history of England since the Norman Conquest. A few artistic and religious ideas came from Egypt in the course of trade, but contacts with the outer world were as serene as life in the island. No town walls were built, and it has been conjectured that this unwarlike people had no army or soldiers, apart from palace guards. Then, at some time shortly after 1400 B.C., they were swept out of existence and forgotten for over thirty-three centuries until A.D. 1900, when Sir Arthur Evans began his excavations on the site of Knossos.

Colonial expansion may have led to the overthrow of Crete, for early in the second millennium B.C., the Minoans began to colonize the adjacent islands of the Aegean, and then established colonies on the mainland of Greece, at Mycenæ, Tiryns and Thebes, mingling with the mainlanders who were different in race and origin, and barbaric in comparison with the cultivated and artistically accomplished Minoans. The refinement and security of life in Crete was unknown in the Mycenæan Empire, which grew from the Minoan colonies after the destruction of Knossos. For example, the Mycenæans allowed scraps of food to litter the floors of their rooms, massive fortifications surrounded and confined the growth of their cities, and protection had to be devised against another enemy, unknown in Crete, Egypt or Babylonia—cold weather. The fortress palaces of Mycenæ, a potent effect upon domestic building in all European countries where winters are sharp or prolonged, and the blazing open fire becomes a substitute for sunlight and the social centre of the home.

A few of the Minoan architectural forms persisted, such as columns with the shafts tapering downwards from the capital, which are found at Mycenæ in the Treasury of Atreus, and one also appears on the Gate of the Lions, between the carved figures. The triangular relieving space above the doorway and the corbelled dome of the Treasury of Atreus have been mentioned in Chapter 1, and that monument with its beehive roof, formed by encircling courses of masonry, progressively diminishing in diameter as they

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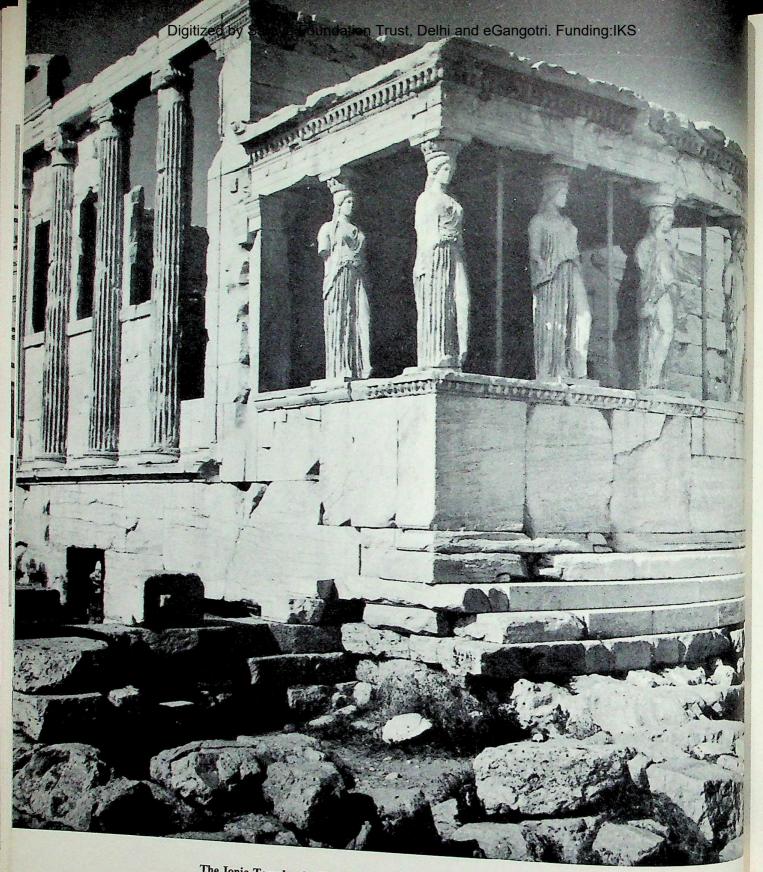


The entrance to the Treasury of Atreus, Mycenæ, showing the triangular space above the lintel.

rise to the apex, represented a structural advance, though it was limited in use and sub-sequently neglected. Above the lintel of the Gate of the Lions, a triangular void had been left, and the sculptured slab inserted: probably the first European example of sculpture used in association with an architectural feature, and the forerunner of the groups of carved figures that adorn the triangular space, called the tympanum, and the frieze of the Greek Doric temples.

Mycenæ is in eastern Peloponnese, built on a hill at the edge of the Argive Plain, with Argos in sight, and the sea visible beyond. It has been in ruins for twenty-five centuries, and Pausanias, the Greek traveller and geographer who visited the Peloponnese in the second century A.D., described the remains of the precincts, and the Gate of the Lions, so the derelict buildings must have stood above ground for some hundreds of years, as examples of technique and design, and the palace within the citadel may have suggested the form of some later Greek buildings. The city consisted of an acropolis and a lower town, both strongly walled. The acropolis occupied the summit of a steep hill, which was a spur of a high mountain behind it, and the royal palace crowned this citadel. The acropolis became a feature of Greek cities: an upper city which accommodated the chief temples and treasure houses. In the Mycenæan Empire, the acropolis was fortified, the rest of the city being appended to this high strong point, in contrast with the Minoan city which was concentrated round a centre formed by the palace or an agora—an open-air assembly place. Like the acropolis, the agora reappeared in Greek cities long after the Minoans had disappeared from history, and the Mycenæan Empire had followed them into oblivion.

The Minoan World and the Mycenæan Empire



The Ionic Temple, the Erechtheion, which stands north of the Parthenon on the Acropolis at Athens. Built 420–393 B.C. to the design of Mnesicles. Reproduced by courtesy of the Mansell Collection.

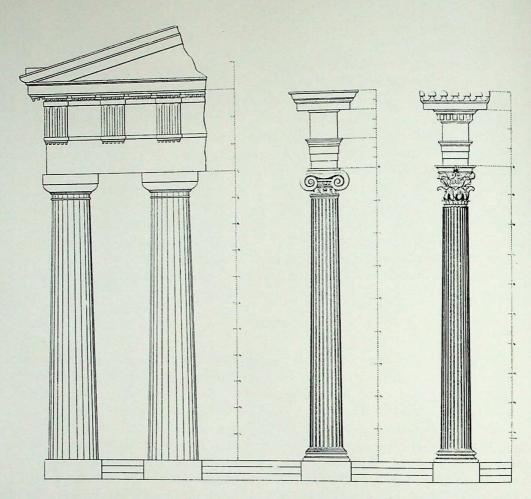
CHAPTER SIX

Classical Architecture: Greek

Apart from such features of city planning as the agora and the acropolis, no architectural heritage passed from the Minoan and Mycenæan civilizations to the Greek city-states of the Hellenic period, which began about 700 B.C. and lasted till 146 B.C., when Greece became a Roman dependency. Some ideas and skills may have come down through generations of craftsmen to the men who first conceived the form and perfected the proportions of the Greek temple. The character of architecture in ancient Greece, and later throughout the Graeco-Roman world, was determined by the evolution and perfection of the three orders of architecture: Doric, Ionic and Corinthian. On their use and variation the classic architecture of the ancient world depended; their proportions, mouldings and formalized ornament regulated the work of Greek and Roman architects and were adopted by other nations, from Syria to India. They were valid guides to design until the western Roman Empire collapsed in the fifth century A.D.; and they reappeared in Italy after nearly a thousand years, spreading once again throughout Europe, from the early fifteenth century onwards, eventually reaching South, Central and North America.

An early form of the Doric order had appeared in the ninth century B.C., before the Hellenic period began, though four hundred years passed before the order reached the matchless beauty it attained in the Parthenon at Athens. Some features of this order may have been suggested by wood construction, or borrowed from an Egyptian prototype; but although ideas about design and knowledge of building techniques have spread from one country to another, the independent evolution and development of architectural forms are characteristic expressions of the vitality of a people, and the Greeks had more artistic and intellectual vitality than any of the other nations with coast-lines on the Mediterranean or the Aegean.

Egyptian architects had achieved regularity and symmetry and had harmonized the



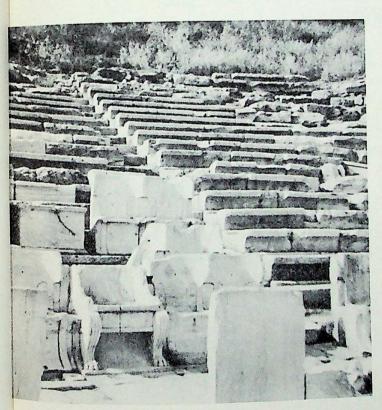
The Greek orders of architecture: left, Doric; centre, Ionic; right, Corinthian. After Nicholson.

relationship of horizontal with vertical members in their temples; but Greek architects achieved far more than the ponderous stability of Egyptian buildings, for the orders gave them a flexible system of design, which never became a strait-jacket for imagination. A building can be as boring as an old man who insists on telling the same story over and over again, and the endless repetition of conventional forms in Egyptian art and architecture have much the same effect; but that never happened in Greece, where buildings became as vividly alive as the Greek mind, which was free, adventurous, speculative and guided by reason. The Athenians, as Clive Bell has said in his essay, Civilisation, 'wished to live richly rather than to be rich; which is why we reckon them the most highly civilized people in history'. This highly civilized outlook is reflected by the stupendous pains the Greeks took to perfect their surroundings, their cities, their temples, and theatres, and everything

they built. The three orders could supply the superlative visual satisfaction they demanded from architecture.

The designers of the Doric temples dedicated their profound knowledge of mathematics and their skill as masons and sculptors to liberating those buildings from all the normal optical distortions, thus exploring a new world of vision and, by means of elaborate and minute calculations and infinite labour, bringing before the eyes of men the real rather than the apparent shape of masses. The stylobate, the long horizontal platform on which a colonnade stands, would naturally appear concave in the middle although it was straight, because the eye would distort it; but the Greeks made that straight line convex so it should be straight in appearance though not in fact; likewise vertical lines that seemed to slant would be made to slant so as to look perfectly vertical. In some slight and imperceptible degree, every stone of the Doric temple was deliberately irregular because every stone was helping to adjust ascending and lateral lines so that a perfection of visual form would be attained which mechanical regularity alone could never attain.

Those subtle deflections which modify the vertical and horizontal lines of a temple



The theatre of Dionysos, Athens. Photograph by the author.



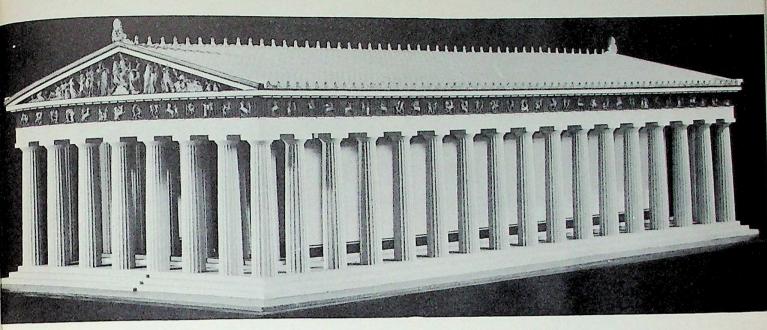
The Tholos, at Delphi. Tholos was the term for the dome on a circular building, and also meant the complete building. Copyright Spyros Meletzis.

like the Parthenon at Athens would never be suspected, nor is it apparent that the Parthenon, like other Doric temples, is really a minute part of the base of a gigantic pyramid which would tower a mile in the air if the inwardly inclined lines of the columns and other vertical features were continued upwards till they met. All these delicate adjustments of form were undetected until in the second half of the nineteenth century detailed measurements of the Parthenon were made by an English architect, Francis Cranmer Penrose (1817–1903). That some deep and fundamental difference existed between Greek and Roman architecture had long been acknowledged, but the secret of the Parthenon's beauty and almost magical serenity, even in its ruined state, had been kept until Penrose revealed it.

The Doric order has the placid strength of maturity. The columns have no bases but rise directly from the stylobate, which usually has three steps. The circular shaft of each column gradually diminishes in diameter from the bottom to the top, and is channelled with twenty shallow concave flutes separated by sharp edges called arrises, though the number of flutes varies: there are, for example, sixteen at the temple of Poseidon at Sunium and twenty-four at Paestum. The height of the column, including the capital, is from four to six and a half times the diameter at the bottom. The diameter of the shaft is gradually reduced as it ascends, and the thickness diminishes on a slightly convex line called the entasis, which corrects the hollow look a straight ascending line would have. The plain moulded capital consists of thin horizontal bands or annulets, with the echinus above —a curved member which supports the square slab of the abacus on the top of the capital. The columns uphold an entablature with three horizontal divisions: the architrave, the lowest which is perfectly plain; the frieze, in the middle, with alternating blocks called triglyphs, carved with upright channels, and metopes, square spaces left plain or filled with sculpture in relief; and above, and slightly projecting over the frieze, the cornice.

The Ionic and Corinthian orders also consist of columns supporting an entablature with an architrave, frieze and cornice; but in both orders the columns rise from circular moulded bases. The Ionic order originated in the Greek colonies of Asia Minor, and has a slender, almost feminine elegance compared with the sturdy Doric; the Corinthian is more luxurious, suggesting an increased regard for display and ornamentation, uncharacteristic of Greek art, and used less than the Doric and Ionic. The capital of the Ionic column is a rectangular block, carved with large spiral ornaments called volutes: that of the Corinthian is much deeper with small volutes at the upper angles and formalized acanthus leaves carved below. The entasis on the fluted columns of both orders is less marked than the Doric, and the flutes are separated by fillets instead of sharp edges. The Ionic capital was sometimes varied by a band of honeysuckle ornament below the volutes. Another form of capital, related to the Corinthian but without volutes, has a single band of acanthus leaves, surmounted by a deeper, outward curving band of blade-shaped leaves, like palm leaves. This type appears on the Tower of the Winds at Athens, and examples have been found in the ruins of Corinth. The acanthus leaf, introduced with the Corinthian order, has been used probably more than any other natural form in architecture and all the crafts that serve building, and by furniture-makers, goldsmiths and silversmiths too. Two species of the acanthus plant grow in southern Europe: acanthus spinosus, with bold, spiny leaves,

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The Parthenon, restored. The first example of Greek Doric architecture in the world, built 454-438 B.C., and crowning the Acropolis at Athens. The architects were Ictinus and Callicrates, and Pheidias was the master sculptor. By courtesy of the Metropolitan Museum of Art, New York, bequest of Levi Hale Willard, 1883.

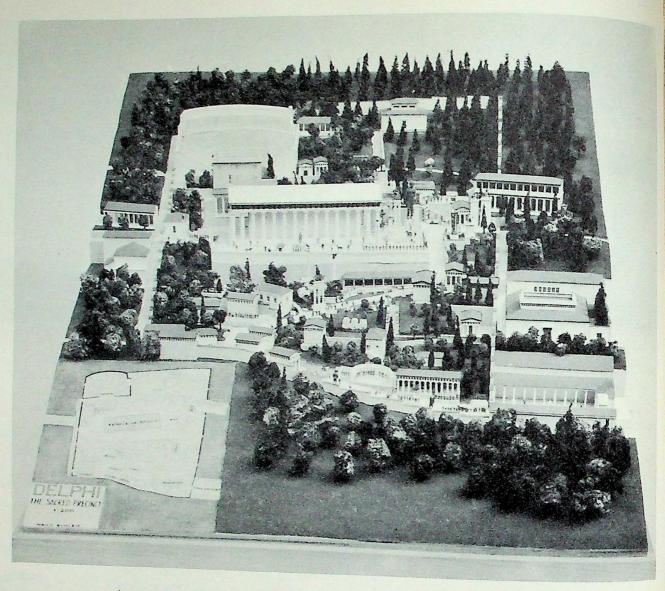
which the Greeks used as their model, and acanthus mollis, with large, deeply cut hairy leaves, which the Romans copied.

Human figures were very rarely used as supports instead of columns, and the most famous example is the south porch of the Erechtheion, an Ionic temple on the Acropolis at Athens, built between 420 and 393 B.C., where six female figures, nearly eight feet high, bear the entablature on their heads. These figures are called caryatids, a word derived from Caryatis, a woman of Caryae, a city that supported the Persians at Thermopylae and was afterwards punished for its action by the Greeks, who demolished the city, killed the men, and enslaved the women. The memory of that enslavement may be symbolized by those burdened female figures, though the term caryatid was not current before Roman times.

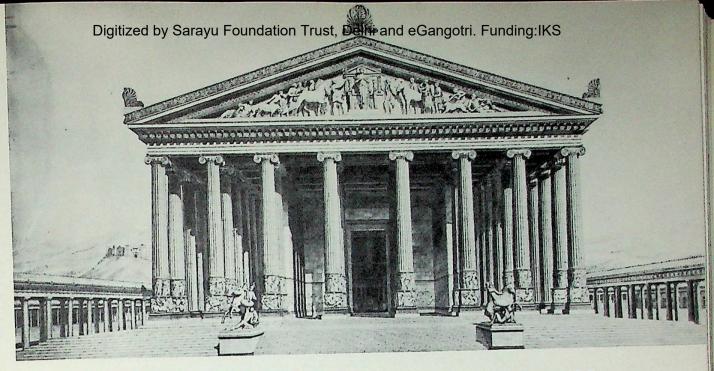
The Doric and Ionic orders were used in the mature architecture of Greece, and in the Acropolis at Athens the Greeks attained the full expression of their artistic genius in the latter half of the fifth century B.C. Between 447 and 405 B.C., the Athenians built the Doric Parthenon, the Ionic Erechtheion and temple of Nikè Apteros (Athena Nikè), and the Doric and Ionic Propylaea, or entrance gateway. The Greek temple was concerned with the external world and with truth, proclaiming lucidly the triumph of art and reason; the building had no inner mystic life, no secret holy place, and although the Parthenon housed a massive statue of Athena Parthenos, cased with ivory and gold over wood, this colossal image of the city's protector was not concealed, but visible to all who entered the temple. The Parthenon dominates the Acropolis, and was one of the works on which Pericles spent

Classical Architecture: Greek





A restoration of the Sacred Precinct at Delphi, showing the Doric temple of Apollo, 530-514 B.C., centre left, with the theatre, top left, the treasuries in the foreground, and the Stoae at the right. The area occupied by the buildings lies on the slopes of Mount Parnassus, and looks as if it had been carved from the mountain side: grey, orange-streaked cliffs rise above the ruins. By courtesy of the Metropolitan Museum of Art, New York. Dodge Fund, 1930.



Restoration of the Ionic temple of Artemis (Diana) at Ephesus, the third temple to stand on the site. Built 356 B.C. to the design of Deinocrates, and included among the Seven Wonders of the ancient world. From a drawing by Arthur Henderson in the library of the Royal Institute of British Architects.

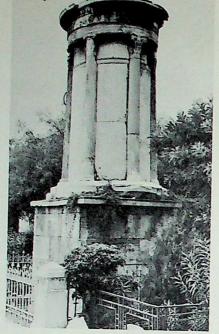
the war chest of the Athenians' allies when he rebuilt and beautified the city. The architects were Ictinus and Callicrates, with Pheidias as the master sculptor, and the temple was built between 454 and 438 B.C. Other Doric temples, such as the temple of Poseidon at Paestum in southern Italy and the Theseion at Athens, are in a better state of preservation, but the Parthenon is the Doric masterpiece. These marble temples were partly coloured, and gilding gave additional brightness to certain moulded details.

The great Ionic temple of Artemis (Diana) at Ephesus in Lydia was built in 356 B.C. to the design of the Macedonian architect, Deinocrates, and occupied the site of an older temple that had been burnt down. The master sculptor was Scopas. As the conjectural restoration on this page shows, it was richly adorned; the lower part of the columns had bands of sculptured figures, with a square sculptured base below, and this lavish use of sculpture and ornament gave the huge building an almost oppressive magnificence. The Parthenon was 255 feet long by 109 wide; the Temple of Artemis measured 391 feet long by 211 wide, and was one of the seven wonders of the world. Oddly enough, the Parthenon was not counted as one of those seven wonders, though the pretentious Mausoleum at Halicarnassus was. This gigantic tomb was erected in 353 B.C., to Mausolus king of Caria by his widow. The tomb chamber was surrounded by Ionic columns, but so many imaginative restorations have been made, that the actual form, while undeniably rich in effect, escapes us, though it seems to have been an elaboration of a pyramid. The name of King Mausolus has been perpetuated; 'mausoleum' is the term used for monumental tombs ever since. Like Deinocrates' Temple of Artemis, the scale of this Ionic structure could not confer the elegance possessed by the much smaller Ionic buildings on the Acropolis at Athens: the Erechtheion, 420-393 B.C., and the temple of Nikè Apteros, 438 B.C.

Deinocrates designed the new city of Alexandria for Alexander the Great, and although

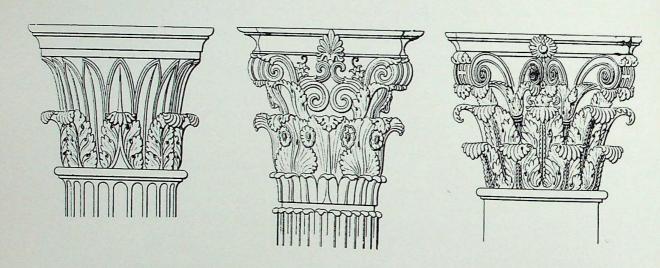
Classical Architecture: Greek

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The Choragic Monument of Lysicrates, Athens. This was a small temple on which the tripods, given to the victorious chorus in the Dionysian contests, were dedicated. Built 335 B.C. The Corinthian columns carry an entablature with a marble dome above. Copyright V. & N. Tombazi.

Below: The Greek and Roman use of the acanthus leaf: left, palm leaf and acanthus capital from the Tower of the Winds, Athens, 100-35 B.C.; centre, Corinthian capital from the Monument of Lysicrates, Athens (shown above); right, Corinthian capital from the Pantheon, Rome (see page 55). After Nicholson.



the most uncharacteristic of Greek cities, this rich, luxurious, cosmopolitan place stood in relation to the ancient world much as New York stands to the modern Western world. The grid street plan, confined between the splendid harbour and Lake Mareotis, suggests Manhattan in miniature; the limitations of that plan were overcome by the variety, size and brilliancy of the buildings that stood on the rectangular sites between the streets, for they were built of dazzling white marble, shaded by colonnades, and below them lay a labyrinth of water cisterns, four or five storeys in depth, supported by thousands of columns.

Rising above the harbour, to a height estimated at 500 feet, was the Pharos, the great lighthouse that may well have been the ancestor of all high isolated towers and, as mentioned in Chapter 1, was a prototype of the Eastern minaret. It stood on the north-east corner of the Island of Pharos, which was linked with the city by a long causeway on arches

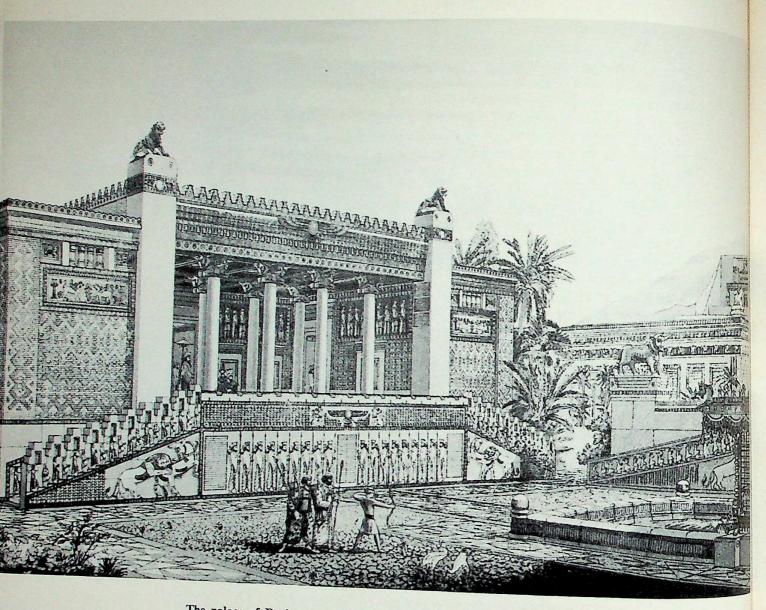
called the Heptastadium, and was built by Sostratus of Cnidus in the third century B.C. Early in the eighth century A.D., the building was partly destroyed by the Arab conquerors of Egypt, and an earthquake in A.D. 1375 demolished all that remained except the lowest storey, and even that finally disappeared. The Pharos was another of the seven wonders of the ancient world, and of the seven, three others were architectural—the Temple of Artemis at Ephesus, the Mausoleum at Halicarnassus, already described, and the Pyramids at Gizeh, two were gigantic statues, one by Pheidias in gold and ivory of Zeus at Olympia, the other in bronze by Chares of Lindus of the sun-god Helios overlooking the harbour of Rhodes, and the list was completed by the gardens of Semiramis at Babylon. The earliest mention of this list was by Antipater of Sidon in the second century B.C.

The Greeks were consistently adventurous in their city-planning. A spirit of enterprise, comparable with that of modern America, encouraged them to propose and try out new ideas. At his first meeting with Alexander, Deinocrates had suggested a scheme for carving Mount Athos at the tip of the peninsula of Acte into a colossal statue of a man whose left hand would hold a spacious city and his right a vast cup into which all the mountain streams would flow, and from thence pour into the sea. The plan was rejected, not because it seemed fantastic, but because Alexander had no use for a city in such a bleak spot, where it was impossible to grow enough food for the inhabitants who would have had to depend on seaborne supplies.

Many of the Greek cities were built on hills; there were no rivers like the Danube or the Seine, the Euphrates or the Nile, to affect their form and way of life; but there were many coastal towns, especially in the colonies, and the inland cities which had grown up around an acropolis were connected with a harbour town, as Athens was connected with Piraeus by a road protected by the Long Walls. The grid plan, which may have been suggested by cities in the Middle East, was a practical and convenient device, never becoming an imprisoning network, with imagination struggling in the meshes, and possibly originated by a desire to make the siting of buildings on a main street or a processional way more orderly and impressive. Hippodamus of Miletus, who worked for Pericles, gave Piraeus a grid plan of broad, straight streets. Walls played a comparatively minor part in Greek cities of the Hellenic period. They were often late additions, confined to the protection of the citadel.

Among Greek architectural innovations and discoveries are the stoa—the portico or detached colonnade, the open-air theatre with its ascending tiers of seats, almost certainly the amphitheatre, and probably the spiral staircase. Our greatest debt to those clearminded, gifted people is the liberation of architecture from gloomy mystery, so that instead of awe-inspiring masses, enlightening forms made men intellectually conscious of beauty, which was something quite different from admiration for gaiety or mere prettiness, and far removed from the terrified reverence evoked by the aloof, superhuman bulk of Egyptian temples and tombs. The Greeks enjoyed a profound sense of civic and artistic responsibility, appreciating and applauding the work of their architects and artists, and regarding art and life as inseparable. Their city states were small enough for the free citizens to enjoy this creative partnership between art and life. The results of that partnership have shaped the architectural history of the Western world.

Classical Architecture : Greek



The palace of Darius, restored. The columns are surmounted by double-bull capitals. The exterior blazed with coloured tiles. The opulent magnificence of a Persian monarch's taste in architecture reflected the arrogance proclaimed by his title, 'king of kings'. After Perrot and Chipiez.

CHAPTER SEVEN

Persians and Greeks

When the Persians overthrew the Assyrian Empire in the sixth century B.C., they borrowed and adapted ideas from the architecture of the conquered people, just as the Assyrians, seven hundred years before had borrowed and adapted architectural forms from the vanquished Babylonians. The Persians were warriors, law-givers and administrators. They knew how to make roads and govern provinces. They instituted a system of posts for transmitting news. They tolerated all religions, and allowed the people they conquered to keep their traditional forms of government. After their conquest of Assyria they controlled the Middle East, imposing unity on the various kingdoms and principalities of Anatolia and Syria that had been at war with each other for centuries, adding Egypt to their Empire in 525 B.C., and dominating the Greek colonies that had grown up on the coasts and islands of the Aegean and eastern Mediterranean. They were on the way to becoming a universal state, but there were flaws in their social structure, and an innate vulgarity of national outlook was revealed by their architecture. They had riches, but unlike the Greeks had not mastered the art of living richly.

Their royal buildings were monumental, aggressively luxurious, relying for effect on gigantic size and brilliant decoration, and, as the Emperor's rule was absolute, royal buildings were government buildings, exhibiting the official face of the nation to the world. Their cities were adorned with spacious houses, their rock-cut tombs were almost as ambitious as their palaces, but every wall surface disclosed a barbaric dread of blank space, and clarity of design in the great palaces at Persepolis was partially obscured by the bewildering repetition of elaborate forms, as in the Hall of the Hundred Columns, built for Darius, 521–484 B.C., and probably used as a throne room. A flat roof of cedar wood Darius, 521–484 B.C., which were thirty-seven feet high, with fluted shafts and highly rested on those columns, which were thirty-seven feet high, with fluted shafts and highly complicated capitals, composed of vertical volutes, four on each side as though over-lapping

Ionic capitals had been placed sideways, with twin bulls above, supporting the roof beams. Although some of the moulded detail on these capitals had delicacy, there was an effect of conflict; too much was crowded into too small a space, and the carved figures of the crouching bulls, back to back, made the capital clumsy and top-heavy. When this device was used with greater boldness and less complexity on the capitals of the columns of the propylaea, the entrance gateway to the hypostyle hall of Xerxes—who succeeded Darius in 485 B.C.—the twin bulls were put directly on the top of the fluted shaft: no moulding modified or softened this abrupt junction of a vertical and a horizontal element. This double-bull device varied in detail and character: the heads of the bulls in the Hall of a Hundred Columns were sleepy-eyed and passive; those on the entrance to the hall of Xerxes were bigger, bolder, and glared downwards with snarling brutality, monstrously threatening.

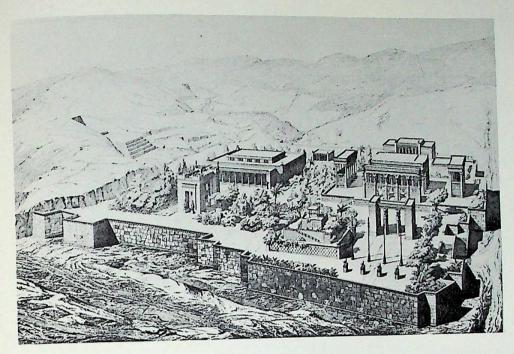
The raised platform was one of the architectural devices the Persians adopted from the Assyrians, and at Persepolis the palace platform rose forty feet above the level of the plain, cut partly from solid rock and partly built up, like the platform of Solomon's Temple at Jerusalem. The platform was approached on the north-west side by a broad flight of steps, shallow enough to allow horses to ascend. Another monumental entrance built by Xerxes had tall piers of coloured glazed bricks, a doorway with a cornice that suggested an Egyptian model, and figures of winged bulls with bearded human heads guarding the opening.

ARCHITECTURE

At Susa, which was the administrative capital of the Empire, palaces were built by Xerxes and Artaxerxes, who succeeded him in 465 B.C. The famous decorative friezes of glazed brickwork, yellow, blue and green, with figures of archers and lions, were found in the ruins of those palaces: virile designs executed with the highest technical skill, and indicative of the major part played by coloured surfaces in Persian architecture.

The impact of this civilization and its exotic architecture on the Greek world was slight. In material power and territorial extent there was no comparison between the Greek city states that still retained their independence and the Persian Empire which stretched from the Aegean to India and had absorbed Thrace, part of Macedonia, and all the Asiatic Greek settlements. Less than a century and a half later the whole of that Empire was conquered by Alexander the Great, but the Greeks had begun their conquest of Persia long before Alexander's army marched in. Greek ideas travelled eastwards, and the power of this intellectual and artistic infiltration was never suspected by the Persians, for the Greeks invaded their empire without any military effort; Greek architects and artists, philosophers and commercial travellers, peacefully penetrated the urban life of the cities and centres of culture, and found everywhere a welcome for Greek fashions and the Greek language. Thus the way was prepared for that great extension of classic architecture, which out the empire he won.

Even when Alexander died, and the system he had created fell apart, the inheritors of the fragments of his empire, the Ptolemies, the kings of Pergamum, and the Seleucids, maintained the outward form of Greek civilization, founded new cities like Antioch, rebuilt existing cities, and erected temples, theatres, palaces and public buildings. Meanwhile the



The palaces of Persepolis, which occupied a great raised platform. After Perrot and Chipiez.

Romans, expanding the area of their rule, and moving in on the former empire of Alexander, adopted and produced their own versions of the orders of architecture, absorbed Greece, Egypt, Anatolia and Syria, and then on the Euphrates, in 54 B.C., came face to face with the Parthians, the successors of the Persians. For nearly three hundred years the Roman and Parthian Empires waged an intermittent and inconclusive war, mutually exhausting and entirely unnecessary. Irreparable damage was done to cities and buildings in these futile campaigns; and in the course of centuries military violence left few traces of the architectural inspiration of Greece in the Middle East, though many Roman remains survived.

Persians and Greeks



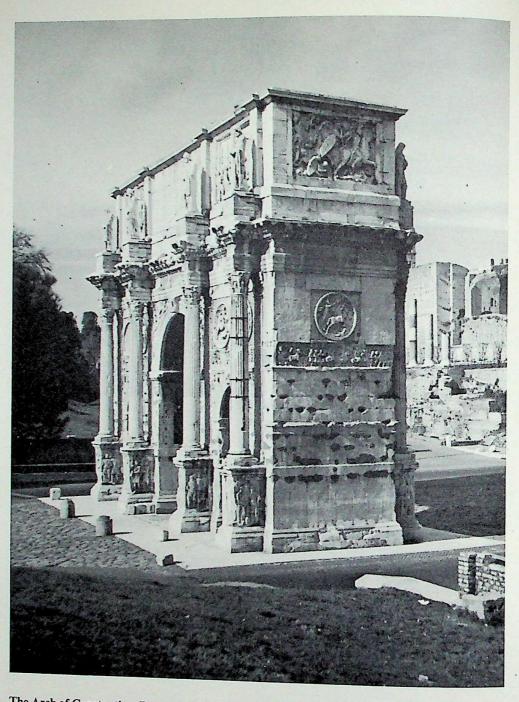
The Colosseum, Rome, also called the Flavian Amphitheatre, begun A.D. 70, completed A.D. 82. The upper storey was added in the third century. The three lower storeys are pierced by arches, and the Tuscan, Ionic and cells and decoration, like the Corinthian pilasters applied to the top storey. The tiers of arcades are supported by and cells and vaults, are largely concealed. Reproduced by courtesy of the Italian State Tourist Office.

CHAPTER EIGHT

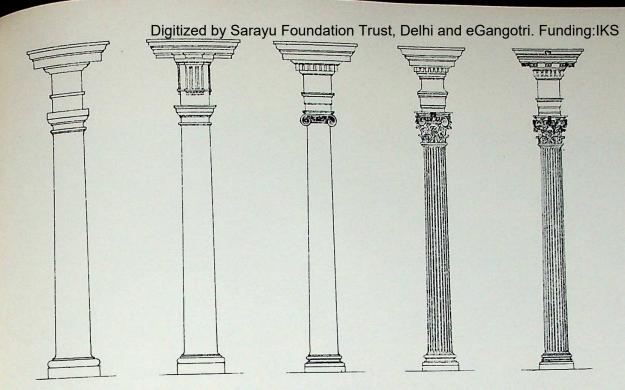
Classical Architecture: Roman

Roman remains in Europe, North Africa and the Middle East, and all the countries formerly included in the Empire, show how much the rulers of that Empire liked bigness for its own sake. They were attracted by mere size, and this respect for magnitude gave Roman architects a new appreciation of their powers. We know a lot about their knowledge and working methods, for an architect named Marcus Vitruvius Pollio—usually called Vitruvius—wrote a treatise in ten books, *De Architectura Libri Decem*, which he dedicated to the Emperor Augustus, at some time late in the first century B.C., or early in the first century A.D. (Augustus died in A.D. 14.) Vitruvius dealt with everything concerned with building—materials, methods, the proportions of the orders and every type of structure, town planning, military machines, and the education, responsibilities and integrity of the architect.

'An Architect should be ingenious, and apt in the acquisition of knowledge', he wrote in Chapter 1 of the first book of his treatise. 'Deficient in either of these qualities, he cannot be a perfect master. He should be a good writer, a skilful draughtsman, versed in geometry and optics, expert at figures, acquainted with history, informed on the principles of natural and moral philosophy, somewhat of a musician, not ignorant of the sciences both of law and physic, nor of the motions, laws and relations to each other, of the heavenly bodies.' This set a high standard. 'Moral philosophy', he said, 'will teach the architect to be above meanness in his dealings, and to avoid arrogance: it will make him just, compliant and faithful to his employer; and what is of the highest importance, it will prevent avarice gaining an ascendancy over him: for he should not be occupied with the thoughts of filling his coffers, nor with the desire of grasping everything in the shape of gain, but, by the gravity of his manners, and a good character, should be careful to preserve his dignity.' If the professional men who were in charge of designing and erecting the structures that



The Arch of Constantine, Rome, A.D. 312. The central and flanking arches are tunnelled through a mass of masonry. The eight detached Corinthian columns support an entablature, which breaks forward above the capitals; and above there is an attic storey on which a quadriga, a four-horsed chariot, once stood. Reproduced by courtesy of the Italian State Tourist Office.



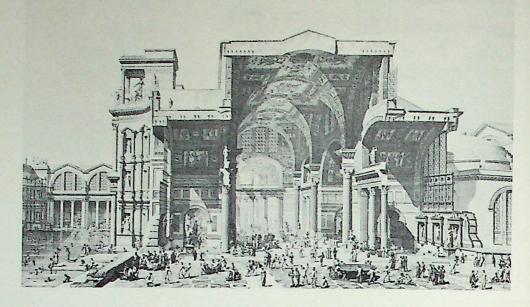
The Roman orders of Architecture. Left to right: Tuscan, Doric, Ionic, Composite, Corinthian. After Rickman.

would satisfy the Roman appetite for magnitude were trained in the way Vitruvius described, the buildings themselves would never suffer from scamped work, ill-selected or cheap materials, or faulty construction.

The Romans, a practical, down-to-earth people, adopted the architectural ideas of other nations, and used them in convenient ways. The Etruscans, who had inhabited central Italy from the eighth century B.C. until they lost their national identity six or seven hundred years later, gave to Rome the arch, the vault, and the dome; the Greeks gave the three orders, which the Romans adapted, and added two others—the Tuscan, closely resembling the Doric, and the Composite, which was an elaboration of the Corinthian. So they had two forms of structure: post-and-lintel, and the arch, though they used the arch as a structural convenience only, and never really appreciated its significance as an element in design. They played for safety, and stuck to the orders: even their triumphal arches were just masses of masonry with an arch tunnelled through. But they used the vault with imaginative daring, as in the Basilica of Constantine, which is a great hall of three vaulted bays. The dome and the half dome were used as devices to cover large spaces: their external effect was ignored. But despite the arch, the vault and the dome, Roman architects were obstinately faithful to post-and-lintel construction, which gave the greatest prominence to the orders.

The Roman interpretations of the Doric, Ionic and Corinthian orders lacked the dignity and elegance of the Greek originals. They became standardized as a system of architectural design that was imposed, like Roman laws and coinage and the Latin tongue, on the whole Empire. No longer enlightening guides, the orders represented rigid rules for giving the proper official look to official buildings, displaying power or insolent wealth, often as empty of meaning as the grandiose architecture of the Persian Empire.

Classical Architecture : Roman



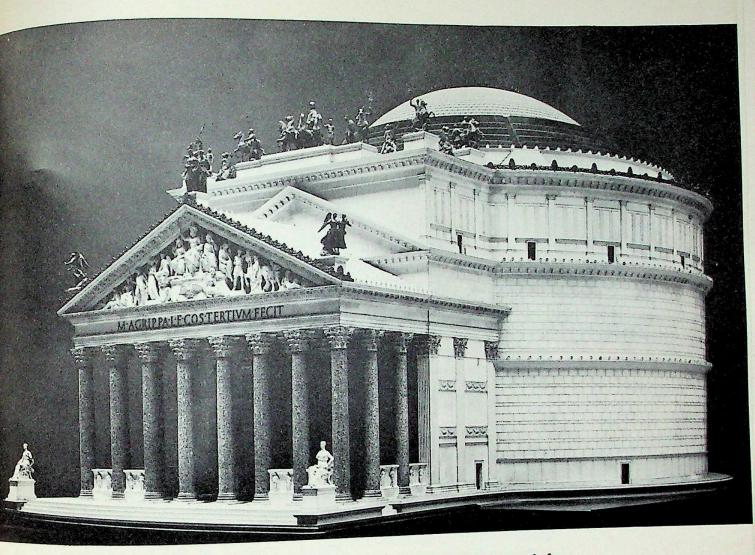
The baths of Diocletian, Rome, A.D. 302, one of the great pleasure centres of the ancient city, which could accommodate over 3,000 bathers. The *tepidarium*, which was the intermediate chamber of the baths, only moderately warm, was converted by Michelangelo into the church of S. Maria degli Angeli, in A.D. 1563. *After Paulin*.

ARCHITECTURE

Admiration for architecture merely because it is old is often misplaced. Not all old buildings are well-designed: some are grim, some crude, some are atrociously vulgar, and many are dull—excuses for the architectural boasting of brassy, irresponsible rich men. This applies to buildings in all ages, because all ages have produced inferior as well as good architects, bad and careless as well as conscientious and accomplished builders, and patronage that was tasteless and trivial or cultivated, sensitive and noble.

Roman buildings by sheer size and strength are in a class wholly different from the works of other civilizations: they are showy, like the Persian, but without the decorative Oriental profusion; they are stable, like the Egyptian, but without the immobility of the Nile temples; they have an arrogant vitality, and, because of the competence of their builders and the iron concrete used in their construction, their powers of endurance defy time, weather and everything except deliberate destruction. They convey no lucid message of truth and beauty which the Greek temples conveyed so unforgettably; they assault the eye with a warning message, for they are advertisements in three dimensions of the might of Rome and say, in effect: 'We are running the show, and are rich, powerful and dangerous: keep on the right side of us, or else. . . .'

There was a basic difference in design and intention between Greek and Roman temples: the former had an external message, no hidden secret places, no mystery. The Roman temple was concerned with creating and adorning an interior that should be spacious and magnificent, satisfying to imperial pride. The idea of a sanctuary for gods had returned, and perhaps the most outstanding example of a building which celebrates that return is the Pantheon, at Rome. The Pantheon, as we see it today, with its superb domed rotunda, about 140 feet in diameter, was built between A.D. 120 and 124 by the Emperor Hadrian. This is the best preserved of all the buildings of ancient Rome and one of the



The Pantheon, Rome, restored. Although built A.D. 120-24, it is by far the best preserved of all the buildings of ancient Rome. This model shows the original appearance. By courtesy of the Metropolitan Museum of Art, New York. Purchase, 1890. Levi Hale Willard Bequest.



The Basilica of Constantine, Rome, A.D. 312. This vast building has a central nave, 265 feet long by 83 feet wide, roofed by a groined vault in three compartments, rising to 120 feet. Also known as the Basilica of Mazentius or as the Temple of Peace. Radio Times Hulton Picture Library.

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most gracious, with its Corinthian portico of unfluted monolithic granite columns, and carved capitals of pentelic marble.

The vastness of temples like those at Baalbek in Lebanon, overshadow Greek temples merely in bulk. The temples at Baalbek, enormous and superhuman as skyscrapers, are deliberately, it seems, intended to dwarf human personality, to express through their cold immensity, the aloof superiority of the gods.

One development from the Greek temple was the basilica, which the Romans perfected. A basilica was a hall of justice, and a commercial exchange, which occupied a central position in the Forum where legal and other business was done. The rectangular plan was twice as long as it was wide. There were two or four rows of columns forming three or five aisles, running the entire length, with galleries having upper columns which supported the roof. The entrance was either at the side or at one end, with the tribunal at the other end on a raised platform, generally in a semicircular space called an apse. On this platform in the apse were seats for the legal dignitaries and there was also an altar where sacrifices were made before business was done. The basilica of Trajan at Rome, built in A.D. 98, by Apollodorus of Damascus, was entered through a portico from the adjoining Forum of Trajan. In Roman London the great basilica stood at the north end of the Forum and opened on to it.

The treatment of Apollodorus of Damascus by the Emperor Hadrian shows the difference between Greek and Roman patronage for architecture. Apollodorus made a light-hearted remark about the Emperor's plans for a temple, because he realized that if the statues of the goddesses seated in the temple stood up, their heads would go through the roof. Unfortunately he made this remark to the Emperor, and lost his client and subsequently his life. It was always politic for architects to conform, not only to the rules of the Roman orders and to avoid taking undue liberties with them, but also to the pattern of bureaucratic and imperial tyranny which ran through the whole Empire. Liberty of a kind existed in a few of the outlying provinces, though not for architectural expression. The orders were honoured everywhere, from Britain to Syria, from Egypt to Switzerland.

The Roman way of city planning was in strong contrast with the Greek, for the latter was not limited or confined by the walls; and, as we saw in Chapter 6, the Greeks never lost the spirit of adventure in town planning, or let walls become a limiting factor. Many Roman cities began as military camps with everything subordinated to the needs of defence. Often those camps were square, with a gate in the centre of each wall and a geometric grid of streets within. This was not an invariable rule. For example, Pompeii as we know it today, is an irregular oval of about 160 acres, sited on a small natural hill, and confined by a stone wall, nearly two miles in circumference. The streets, while approaching a symmetrical arrangement, are not really symmetrical, as there is hardly a right angle, or any approach to a right angle at any street corner—an agreeable variation from the hard-and-fast grid plan. Pompeii was a residential city, refounded about 80 B.C., peopled by soldiers discharged from the army, and destroyed by the eruption of Vesuvius in A.D. 79.

The Romans were not always faithful to the grid plan, and occasionally abandoned the square. Vitruvius describes an eight-sided town with walls enclosing a web of streets that formed eight wedge-shaped blocks. No processional ways or grand approaches led to the open central space, where the Forum—that Roman equivalent of the Greek agora—stood. This polygonal plan had the same uncompromising rigidity of the square cities with their grid; though unadventurous, all practical and material things were considered—health, water-supply, drainage and protection. All their cities had every comfort: aqueducts strode across country on double or triple tiers of arches to supply abundant water; the spacious public baths were social centres, dedicated to pleasure; in the colder provinces, like Britain, town and country houses had efficient heating systems, with hot air passing through hollow tiles in floors and walls, and even a small provincial place like Silchester in Hampshire, or a garrison town like Caerleon in Monmouthshire, had an amphitheatre outside the walls.

Vitruvius, in Chapter 5 of the first book of his treatise, has a lot to say about walls and towers. He specifies that the thickness of the walls should be sufficient 'for two armed men to pass each other with ease', adding: 'The distance between each tower should not exceed an arrow's flight; so that if, at any point between them, an attack be made, the beseigers may be repulsed by the scorpions and other missile engines stationed on the towers right and left of the point in question.' These directions were for city walls: they were written before frontier walls were necessary.

The notion of building long, thick walls to protect a country or a province against the

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inroads of barbarians, had originated in China, where the Great Wall dates from the third century B.C. Much later, about A.D. 142, the northernmost border of the Empire was protected by a wall, thirty-seven miles long, between the Clyde and the Forth in Scotland, built when Antonius Pius was Emperor. Twenty years earlier another one, farther south, stretching for seventy-three miles between Solway Firth and the Tyne estuary, was built by the Emperor Hadrian, and finished about A.D. 127. The Limes in upper Germany and Switzerland, the linked fortifications that protected the north-eastern frontier of the Empire, were probably built under Hadrian.

The idea of walling out the barbarians was unlikely to have reached Rome from China, and nothing on the scale of the Great Wall was attempted by the declining Empire. The Chinese defences lasted for centuries: the Roman were relatively short-lived for the barbarians ultimately flooded through them and began a new chapter in the history of Europe and of architecture.

CHAPTER NINE

East and West: Colour and Form

The architecture of the Greeks visibly demonstrated their intellectual culture, their respect for reason, their pursuit of truth and beauty and the value they set on purity of form. The architecture of the Middle and Far Eastern civilizations lacked the clarity and precision of the Greek and Roman classic orders, though Persian and Indian architects used columns and colonnades. For example, in the sanctuary of Karli, the largest and most splendid of the Indian cave temples, the Chaitya-hall is flanked by octagonal pillars with elephant capitals, which separate the nave from the aisles, and support a vast circular roof. The nave of this rock-cut temple, built at some time between 50 B.C. and A.D. 100, resembles the interior of some early English Gothic cathedral.

Accomplished, varied and elaborate, Eastern architecture depends far more on colour than on form, for it is an architecture of emotion and mystery. Great masonry masses are covered with intricately carved ornament, so they appear to be draped with textiles of brilliant pattern and hue, frozen in position, softening the outlines of every feature. No composition, no grouping of features and masses, ever resembles the serene stability of a Greek temple or the grave dignity of a Roman basilica. Nothing is at peace. A restless Greek temple or the grave dignity of colour have given, and still give, a dazzling vivacity to Oriental buildings everywhere.

Alexander's raid on Northern India, his conquest of what is now Pakistan, made no lasting impression on Indian architecture, though one of the results of his invasion and the contacts with Greece and Persia that followed, was the introduction of the technique of stone carving. Some traces of the classic orders have been found. The temple at Jandial, stone carving. Some traces of the classic orders have been found. The temple at Jandial, to the east of Peshawar, had a portico of Ionic columns, though this example of Classical influence was filtered through Parthia: a fact which dates the building, as the period of Parthian dominance in that region was between 50 B.C. and A.D. 65. The lush

interpretations of the Corinthian and Composite orders on some buildings of the ancient province of Gandhāra, suggest a Roman origin. Contact certainly existed between the Roman Empire and India, Pakistan and Afghanistan, for the trade routes and commerce of Rome extended far beyond her borders. Objects of Indian origin have been found in the Mediterranean area, and coins and objects of Roman origin found in India and Ceylon. Such contacts were established as a result of trade; there were no cultural contacts which could have mingled the architectural ideas of East and West to their mutual stimulation. That came later, in Europe—not Asia—in Constantinople, with its eastern affiliations, through the Arab conquests of the seventh and eighth centuries, which brought Spain under their dominion and established a flourishing Oriental civilization, and in cosmopolitan Venice, the commercial and artistic meeting place of East and West.

Some Eastern conceptions of architecture penetrated the Graeco-Roman world through the power of two religions: Mithraism and Christianity. Both had emotional needs which affected the character of the Mithraeum and the early Christian and Byzantine churches. The Mithraic cult originated in Persia, where Mithras was worshipped as the god of light. The cult was introduced to the Roman world during the first century B.C., and gradually spread over the whole Empire in the course of two hundred years, appealing particularly to soldiers. It was a democratic religion, slaves, patricians, legionaries and their officers, worshipped side by side in the Mithraeum; but it was for men only; women were excluded. With the Greeks it was never popular: its rites and mysteries were too barbaric for their educated taste. It became the most serious competitor to Christianity, and the form of its sanctuaries and chapels may have suggested some of the characteristics of the early churches. The temple or cave where the rites were celebrated was made in the likeness of a vaulted chamber, hewn from solid rock, and often built underground. The chapels were very small; barely fifty people could worship in them, and even the largest could scarcely accommodate a hundred.

The idea of a cave, a mysterious, dimly-lit sanctuary, had a profound influence on the early Christian communities, who had first met in catacombs and other secret places, during the centuries when Christianity was a persecuted religion. But when Constantine made Christianity the state religion of the Empire early in the fourth century, and the Christians became a political as well as a spiritual power, they still retained the half-lit, mysterious atmosphere of their churches. Mithraism survived until after A.D. 400 in the remoter parts of the crumbling Empire, but had been consistently and savagely persecuted by the Christians in the latter part of the fourth century, and almost stamped out. The Christian churches retained the mark of Oriental influence: the mystery was there; internally, form was drowned by colour; the swarthy gloom that Milton called 'a dim religious light' was already identified with sacred edifices in the fourth and fifth centuries, and conveyed by painted walls and mosaics, rich in tone, grave in effect and undistracting to the eye, for the East achieves a serenity through the use of colour that the West achieves through form. Presently, the Western mastery of form and the Eastern mastery of colour were united in Byzantine architecture and in Venetian Gothic.

For two thousand years, indirectly and at irregular intervals, Eastern ideas have affected the architecture of the West; but there has not been a two-way traffic—the effect of Western

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art, architecture and culture on the East made by Alexander's raid was neither revolutionary nor lasting. Although early Arab architecture, like the Dome of the Rock and the Mosque-el-Aksah at Jerusalem, built at the end of the seventh century A.D., have the characteristics of Byzantine buildings, this may arise from the partial conversion of existing buildings and the extensive borrowing of materials and decorative details; but in both buildings pointed arches are used—a form that changed Western architecture over four hundred years later. The flow of Eastern ideas westwards was helped by trade, by the Crusades, and continuously by that Oriental outpost, Moslem Spain, where Cordova, with its university and flourishing arts and industries was a centre of culture.

The chief difference between classical and Eastern architecture is that the buildings of Greece and Rome repose; those of the East strive; feeling and emotion have given them a restless vitality, as uncontrolled and clamorous as a riot. They recall the non-stop babble of an Oriental bazaar, just as a Greek temple suggests the reasoned conversation of intelligent men with open, active minds. In the West, use has governed form. In the opening chapter of the first of his ten books, Vitruvius wrote: 'In architecture, as in other arts, two considerations must be constantly kept in view; namely, the intention, and the matter used to express that intention; but the intention is founded on a conviction that the matter wrought will fully suit the purpose. . . .'

When use governs form, architecture is an intellectual art; when emotion governs form, reason abdicates, and faith takes over. And faith can move mountains, and create architectural masterpieces. The emotions of love and grief created the Taj Mahal, the greatest example of Mogul architecture. The faith of Christendom created the Gothic cathedrals of Europe, and although the ghost of the classic orders haunted the Middle Ages, and was never laid in Italy, the inspiration and daring of the Gothic builders was generated partly in the East.

East and West: Colour and Form



Interior of an early Christian basilican church, St. Paul's-outside-the-Walls, Rome. Founded A.D. 380, destroyed 1823, and rebuilt to the original design. Copyright Italian State Tourist Office.

CHAPTER TEN

Early Christian, Byzantine and Sassanian Architecture

After the Edict of Toleration of 313, Christians were free to design and build their own churches, and they modelled them on the Roman basilica, with a semicircular apse at one end, a wide central aisle or nave, with one or two aisles on either side of the nave, and a narthex, which was a wide, deep, arcaded porch forming an entrance. An open square or rectangular forecourt lay in front of the church called, like the entrance court to a Roman house, the atrium. The classic tradition was continued, and rows of closely set columns supporting an entablature separated the nave from the aisles. When the columns carried arches, which rested on the abacus—the topmost member of the capital—they stood farther apart. The simplest type of timber roof, flat or pitched, was used. The tower, that characteristic feature of Christian churches, was probably introduced late in the fourth or early fifth century. A church with twin round towers is carved as a symbol of Jerusalem on some ivory tablets from a casket which dates from about 400.

At first the Christian communities were poor, and used materials from older, abandoned buildings, but as the Church became well organized, powerful, rich and intolerant during the fourth century, columns, capitals and marble wall facing were looted from temples that were closed and deserted, following the Edict of Theodosius, 380, which branded as heretical all religions other than Catholic Christianity. In the sixty-seven years between 313 and 380, Christianity acquired powers that rivalled those of the state, and during that time churches rose up all over the Empire. Ruins in Syria and Asia Minor, dating from the fourth and fifth centuries, indicate the scale of building activity after Christianity became the state religion. Of these, the Church of the Nativity at Bethlehem, founded by Constantine in 330 over Christ's traditional birthplace, has great simplicity of plan, with a nave, double aisles, and a sanctuary with three apses. In countries like Italy, where the Christian religion has enjoyed unbroken continuity since the days of the Empire, many churches

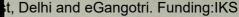


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exist which incorporate some part of an early structure, or have been carefully reconstructed like the basilican church of St. Paul's-outside-the-Walls at Rome, founded about 380, destroyed in 1823, and rebuilt to the original design. Many, like St. John Lateran at Rome, first built in 330, have been so extensively remodelled that the Early Christian character is lost.

From the fourth to the seventh centuries, the basilican form characterized the Early Christian style, though outside Italy and other Mediterranean countries where sunlight was strong and bright, a new significance was given to windows, which forecast the ultimate conquest of solids by voids in the last period of Gothic architecture. A contemporary description exists of a fifth-century basilican church at Lyons, built by Patiens, the Bishop of Lugdunum (Lyons). This had a triple colonnade of marble columns, and rich decoration. No mysterious dimness shrouded the interior, where, as the writer said, 'the light flashes and the sunshine is so tempted to the gilded ceiling that it travels over tawny metal, matching its hue'. Coloured marbles covered the vaulting, the floor, and the window frames, forming on the latter 'designs of diverse colour, a verdant grass-green encrustation' that brought 'winding lines of sapphire-hued stones over the leek-green glass'. The description occurs in a short poem by Apollinaris Sidonius, born about 430, probably at Lyons, who became a Prefect of Rome in 467, and Bishop of Arverna (Clermont) in 472.

Early Christian basilican churches of the fourth, fifth, sixth and seventh centuries, showed no advance in the use or understanding of the arch principle. Their builders depended on post-and-lintel construction. Apart from their re-use of columns from older buildings, and the impressiveness of a procession of such columns on each side of the nave, nothing new emerged from their combination and adaptation of old forms,





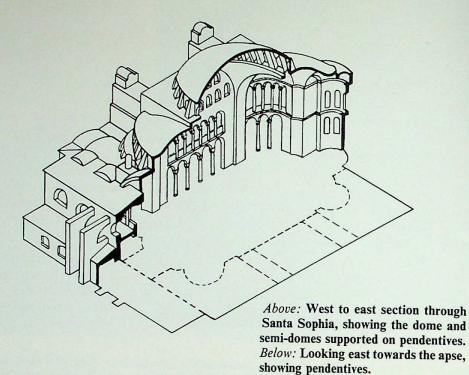
Opposite and left: Exterior and interior views of Santa Sophia, Constantinople, A.D. 532-37. Reproduced from drawings made by Gaspard Fossati, published in 1852, which show the building after it had been restored by the order of the sultan, Abdul Medjid. (See structural diagrams on page 66.)

though richness and depth of colour came from the increased use of painted surfaces and mosaics.

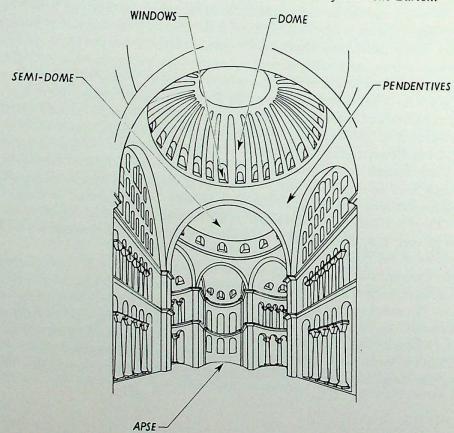
No fresh ideas inspired domestic architecture during this period of decline. There was luxury for the rich, even in provinces like Gaul, threatened and partly occupied by barbarian hordes, where many aristocratic landlords continued to live in splendid houses on their self-contained estates, amid fields, orchards and vineyards. Sidonius, who was one of them, wrote a poem about the luxurious bathroom in his own house at Avitacum. His description, written at a time of world-upheaval, has an air of easy-going complacency; this probably reflected the attitude of cultivated, well-to-do people in regions where the old social system and the technical skills that kept it going encouraged the belief that the Roman way of life was eternal and threatening changes merely passing inconveniences. So wealthy people enlarged and repaired their houses, and built chapels and oratories for their households. Gaul, when Sidonius lived there, still preserved the civilized amenities and architectural accomplishments of a rich province, and some of these were transmitted to medieval France. The French village was descended from the cluster of dwellings for slaves and servants grouped about the villas of the Gallo-Roman landlords: the parish church from the oratories on the great estates.

While Christian architecture remained static in the West, a new style grew up in the Eastern Empire, following an adventurous and experimental use of the second structural invention. The arch was freed by Byzantine Greek architects from the confused association with post-and-lintel construction to which it had been condemned by the obtuseness of mind and deficient imagination of the Romans, whose preoccupation with mere size kept them faithful to monumental masses and enormous columns, and prevented them from realizing that the arch could be a vital and controlling structural element in design. The

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Drawn by Marcelle Barton.



Romans never saw much beyond the practical but pedestrian advice of Vitruvius, who recommended the use of relieving arches over beams or lintels. The Greeks of the Eastern Empire saw much further, and gave substance to their vision.

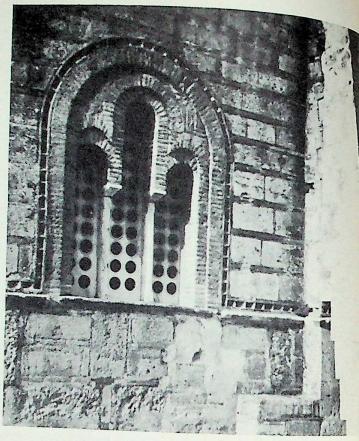
The development of the new arcuated style followed the wave of building activity that rippled over the eastern provinces when, early in the fourth century, Constantine moved the capital from Rome to Byzantium in Thrace on the Bosphorus, enlarging an old town that was originally a Greek colony, and laying out new streets and open spaces. For political reasons the name New Rome was adopted, but it was also called Constantinople in honour of the founder while, rather confusingly, the original name, Byzantium, was used as well. The city, dedicated to the Virgin in A.D. 330, was nominally though not exclusively Christian; at first a tolerantly pagan air distinguished the cosmopolitan place, and the historian, Zozimus, who lived there in the latter part of the fifth century, wrote that after enlarging the city, Constantine 'built a palace little inferior to that of Rome, and very much embellished the hippodrome, or horse-course, taking into it the temple of Castor and Pollux, whose statues are still standing in the porticoes of the hippodrome. He placed on one side of it the tripod that belonged to the Delphian Apollo, on which stood an image of the deity. As there was at Byzantium a very large market place, consisting of four porticoes, at the end of one of them, to which a numerous flight of steps ascends, he erected two temples; in one of which was placed the statue of Rhea, the mother of the gods. In the other temple he placed the statue of the Fortune of Rome.'

This transformation of a distant provincial town into the capital of a vast empire had a stimulating effect on trade, art and architecture, comparable with the founding of Alexandria, six hundred years earlier. Like Alexandria, Constantinople was destined to become a melting pot for the ideas and cultures of different races. Asia was just across the Bosphorus. Oriental ideas of colour and decoration flowed into the new, expanding city, and were interpreted by the native architects and artists of Byzantium, for whom the demands and taste of an opulent society provided opportunities to build ambitiously and magnificently. Apart from the patronage of affluent aristocrats, the Church was able to employ architects on buildings that eclipsed those erected purely for personal aggrandizement or public entertainment. Roman Imperial architecture in the hands of the talented Byzantine Greeks acquired a new look; during the fourth century the Roman Empire acquired a new look too, for it was divided under two Emperors, one ruling the West from Rome, the other the East from Constantinople.

Gradually the balance of political power shifted to the East, and Constantinople became the trustee of Graeco-Roman culture and civilization. Disastrous barbarian raids diminished the power, size and dignity of the Western Empire. Rome was sacked by the Goths in 410; province after province was conquered or abandoned and left, like Britain, to its own resources, early in the fifth century. Gaul, which included what is now France and Belgium, maintained a semblance of civilized order, with isolated pockets where life went on much as usual, like the district where Sidonius had his comfortable home; Spain, the oldest of the Roman provinces, was attacked by the Vandals, and ultimately became a Visigothic kingdom; in 476 the Western Empire ended, with the abdication of the last Emperor, Romulus Augustulus, and Italy became part of the Empire of the Ostrogoths.

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The Byzantine church at Daphni, on the Sacred Way from Athens to Elusis, built in the ninth century. Left: General view showing drum and shallow dome. Right: Detail of triple-arched window. Photographs by the author.

The Eastern Empire at the beginning of the sixth century included the Balkans, Anatolia, Syria and Egypt, with Constantinople as the focal point of the old civilization. Behind the unassailable walls of that city, the cultural heritage of the ancient world was defended, and this last outpost of a shrunken Empire survived until conquered by the Turks in 1453.

After this second flowering of the Greek genius in the fifth and sixth centuries, from which the Byzantine style arose, architects were content to continue that style for nearly a thousand years, with local variations of decoration, but no fundamental changes. The intellectual rejuvenation of architecture had ended the age-old allegiance to post-and-lintel construction; but no new adventures were encouraged in the corrupt atmosphere of the later Byzantine Empire. Before the decline of that Empire there was a brief period of political expansion, military achievement, and activity in the arts. The Emperor Justinian I, who reigned from 527 until his death in 565, reconquered Italy, the south-east part of Spain, and the whole of North Africa from Egypt to the Atlantic, leaving the Empire exhausted and impoverished by those temporary triumphs. Far more important for civilization was the Emperor's patronage of architecture.

In 532 work began on the great church of Santa Sophia at Constantinople, which was completed in five years. The architects, Anthemius of Tralles and Isodorus of Miletus, modestly admitted that their design had been guided by the celestial inspiration of the Emperor, which was tactful as their patron was a humourless fanatic who had ended classical studies and killed intellectual adventure by closing the famous schools of Athens, establishing the Age of Faith in place of the Age of Reason. But he never suspected that Santa Sophia was as great an intellectual adventure in terms of architecture as the Parthenon, or that his architects were using the arch and the dome to give a new interpretation to the Western ideal of form and using the soft, plastic and infinitely flexible material, mosaic, to give a new interpretation to the Oriental ideal of colour.

The Byzantines used brickwork and concrete in construction, which provided an internal surface admirably adapted for applying marble and mosaic. The sharp clarity of form was lost in a coloured mist, as mosaics flowed over walls and gave to the curved surfaces of arches and domes and semi-domes rich, darkly gleaming compositions in ruby and gold, deep blue and soft olive green. The emotional impact of Byzantine interiors was far greater than anything Oriental architects had hitherto achieved, for they had relied on colour alone: the assault on the emotions was irresistible when the Byzantine Greeks used their mastery of colour with their traditional mastery of form. Nothing previously built in the East or West had united such dissimilar ideals. The Byzantine churches were square or polygonal in plan, and by an adroit use of arches, semi-domes and pendentives, their architects were able to float a large shallow dome over a central space.

Santa Sophia is the supreme example of this technique of arcuated construction. The church has an oval nave, 225 feet long by 107 feet wide, and the great dome, which rises to a height of 180 feet, seems to hover above the central area, which is a square, uninterrupted open space, with massive stone piers at each corner that support the four semi-circular arches and the pendentives on which the dome rests. The pendentives are the curved triangular spaces, formed between the arches, which give a continuous supporting

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surface for the dome. (These structural details are shown on page 66.) East and west of the central area are semicircular spaces, roofed by half-domes and flanked by tall alcoves also rising to half-domes, and at the far eastern end there is a great apse.

Arches, pendentives and domes melt into each other, and create an illusion of movement, as though the semi-domes and the great dome too were gently oscillating, an effect produced possibly by the play of daylight on the dull gold of the mosaics, helped too by the figures of six-winged cherubim that fill the pendentives and seem to carry the great dome aloft on their pale green and brown pinions. That dome is lit by forty small arched windows, pierced in the lower part, which, according to some authorities were not originally a part of the design, but were openings left for scaffolding when building was in progress. North and south of the square below the dome are two arcades, one above the other, and the piers at the corners of the square are pierced to allow the aisles and galleries to pass through.

With the example of the Ionic and Corinthian orders before them, the designers of Santa Sophia invented what is virtually a new order, with capitals shaped to simplify the transition from the column to the cube of marble it supported, and these capitals were elaborately carved with an intricate lace-like effect. The habit of re-using columns from older buildings persisted, but Byzantine architects were more skilful in selection and adaptation than the Early Christians. The lower and upper storeys of the aisles that flank the central space have columns of dark green marble brought from the temple of Artemis at Ephesus, and dark red porphyry columns from the Roman temple at Baalbek are used in the four exedrae-the recesses or alcoves that adjoin the spaces below the semi-domes, east and west of the central area. All these columns have, in place of their original Ionic and Corinthian capitals, those of the new order, which, despite the delicacy of design and execution, look top-heavy on the borrowed material. Certainly this loot contributes to the richness of effect; indeed, there is a sensuous, exotic atmosphere within Santa Sophia; the old conception of a dark, mysterious sanctuary has been abandoned; light descending from above, light pouring through innumerable arched windows, gives new values to form and colour. The shadows of the Mithraeum and the catacomb withdrew, and light was used to illustrate the marvels and mysteries of the Christian faith by animating the mosaic compositions and paintings that covered the walls.

Nothing like Santa Sophia was ever built again. Byzantine churches with a principal dome and various minor domes and semi-domes were erected, but nowhere was the arch principle employed with the mathematical precision and intellectual delight which gave to the interior of Justinian's church that interplay of mounting and expanding curves. The masterpiece was never repeated; not even on a smaller scale. St. Mark's at Venice, built five centuries later, was inspired less by Santa Sophia than by the Church of the Apostles at Constantinople, which was demolished in 1463 and replaced by the mosque of Sultan Mahomet II. The Romans had buried the arch in the wall: the Byzantines rescued and glorified it, opening up a new world of architectural possibilities; but they did not explore that new world. Like the Egyptians before them, they established their style and were blindly faithful to it, building in the same way and repeating the same ideas for over nine hundred years, gradually losing the challenging clarity of their earlier work and forgetting

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The Ca d'Oro, one of the late Gothic palaces in Venice, shown in the centre, built for Marino Contarini, completed about 1430, and so named because of the lavish amount of gold decorating the façade. *Photograph by Paul Rathbone*.





The Villa Capra, Vicenza, by Andrea Palladio (1518-80). A square building with a portico on each side, opening into a central hall roofed by a shallow dome. *Photograph by Paul Rathbone*.

the transfiguring effect of light. The structural lines, masked by the deep hues of mosaics, were lost in gloom, deliberately contrived, so that the mysterious dusk dispelled from the interior of Santa Sophia was restored to later churches.

This return to obscurity with an increasing dependence on colour at the expense of form reflected the character of the later Empire, stifling in an atmosphere of superstition and corruption, when innovations were repressed and intellectual activity of any kind was identified with heresy. Working in such conditions, architects were compelled to sacrifice form, which expressed logic and reason and mental lucidity, and to rely more and more on colour, the vehicle of emotion and faith. In Santa Sophia alone was the mystical character of a sacred building enhanced by daylight, and the emotional appeal of the interior was so powerful that the Crusaders who sacked Constantinople at the beginning of the thirteenth century believed that the great dome had been raised by magic, not by men.

One of the smaller churches that still survives in Constantinople is St. Saviour in the Chora, built originally about A.D. 413 on a site probably occupied by an earlier church. It was repaired over a century later by Justinian, sacked by Christian champions during the Fourth Crusade when they were looting Constantinople, and restored during the fourteenth century. Although the mosaics in the church date from that time, they are probably based on earlier designs, and because of their richness the church was formerly known as the Mosaic Mosque. Some of the designs are vividly defined by the introduction of black and white, but the whole interior appears to be covered with cloth of gold, and the crude, rugged figures portrayed are assembled in a masterly pattern. The central dome rests on a tall drum, pierced by arched windows, and surrounded by smaller domes. From below, it appears to be floating above the space beneath, which is free from any supporting columns. Externally, the walls have a great deal of surface variation, with shallow alcoves separated by slender attached columns without capitals.

St. Theodore at Athens, repaired in A.D. 1049 according to an inscription over the entrance door, was probably built earlier, about the same time as the church of Kapnikarea, also in Athens, which dates from A.D. 875. Both have small central domes rising on octagonal drums, and double and triple arched windows, divided vertically by slender columns which support the arches. Both churches are very small in size. A much larger church built in the late ninth century still stands at Daphni, six miles from Athens on the Sacred Way to Eleusis. The walls are of sandstone, with lines of red tile set between the horizontal and vertical joints, and some materials from a temple of Apollo, that once stood on the site, are used in the structure. The interior of the shallow dome is clothed with mosaic of exceptional richness, for the squares of glass, many of them of minute size, have a thin layer of colour or gold leaf fused into them. Every available surface inside is covered by mosaic or fresco, but the painting is pallid compared with the richness of the mosaic. Both paintings and mosaics were damaged by the Turks, who, after the fall of Constantinople in 1453, gradually penetrated Greece, and reached Daphni two years later, where the Moslem troops amused themselves by using the saints and other holy figures depicted in the church as targets for their arrows. There are double and triple arched windows, vertically divided for just over half their height by thin columns with

Early
Christian,
Byzantine and
Sassanian
Architecture

the brickwork of the arches descending to meet them. The windows are filled by thin marble slabs, pierced with small circular holes which are glazed—a very simple form of what was later known as plate tracery—and there is abundant light in this church which recalls the earlier phase of Byzantine architecture.

When that architecture was transplanted and removed from the unwholesome influence of the Empire, it blossomed afresh, and soon spread westwards to Italy and Sicily, eventually penetrating north-westwards to Russia, to Kieff, Novgorod and Moscow, when the Empire had ceased to exist. After Santa Sophia, the greatest example of the Byzantine style is St. Mark's at Venice, built between A.D. 1042 and 1071, on the site of a basilican church that was founded about 864. The complex but impressive façade faces the great Piazza and has five arched portals, and a perplexing array of decorative features: mosaic panels, trophies, and alabaster and porphyry columns from Constantinople and Alexandria, knit together by the framework of tall arches, for those on the portals are repeated above on a smaller scale. The shape of those arches is re-emphasized by the domes, and their placid stability calms the restless elements that might otherwise appear to be in endless conflict. There are five domes, marking the plan of the church which is that of a Greek cross. The central dome is forty feet in diameter, and those covering the arms of the cross are slightly smaller, and none corresponds with the enlarged external shapes that rise above the façade, for those are timber additions made in the thirteenth century. The canopied niches and pinnacles with crockets were added in the fifteenth century, possibly with the intention of contrasting delicate stonework with brilliant mosaics.

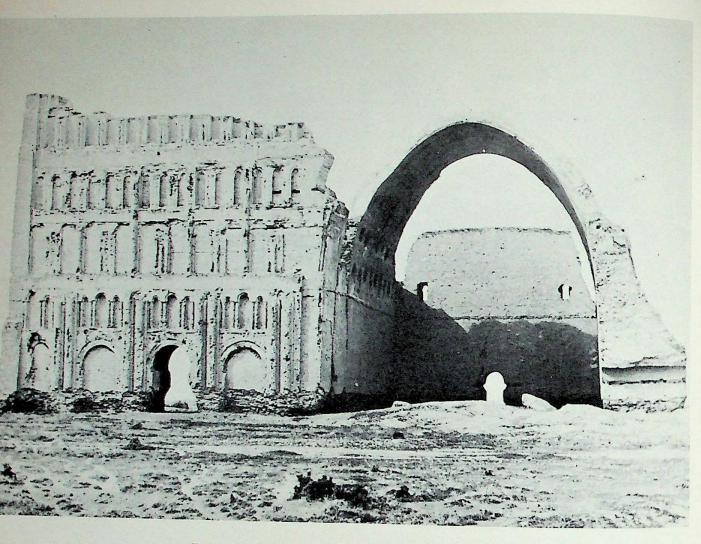
Within, some of the structural frankness of Santa Sophia is recovered. The five domes float up from arches and pendentives, and the curved surfaces of domes, vaults and apses seem to be expressly designed for an all-over covering of mosaic, an unbroken skin of gold that takes complete control of the architectural character. Nothing is allowed to interrupt the continuity of this glowing surface, which flows over every curve and fold, gorgeously pictorial. St. Mark's was the last great example of Greek genius finding expression through arcuated construction with colour as the architectural motive.

While the Byzantine style was still in the early stages of triumphant experiment and structural adventure, the arch was being used in Persia under the Sassanian dynasty. Few remains exist of the wealthy cities that once stood in Mesopotamia: besieged in the wars of Rome and Parthia, plundered and finally deserted, only the names of a few have come down to us, the most important ruin being that of the palace at Ctesiphon on the borders of the Tigris, built of coloured brickwork in A.D. 550 by Chrosroes I. The plan of the palace was simple, consisting of a great hall, 163 feet long by 86 feet wide, covered by an elliptical barrel vault, open to the front and forming an immense portal, 95 feet to the crown of the arch. The façade with this arched portal in the centre rises to just over 112 feet, and reproduces the decorative arcading of a Roman amphitheatre, but instead of the attached columns of superimposed orders separating the arches as they do at the Colosseum at Rome and the amphitheatre at Arles, semicircular attached shafts without capitals provide convex features which contrast with the tiers of blind arches. Apart from the feat of erecting the great vault, and the use of hollow boxing in the upper part of the walls to lower the centre of gravity and increase stability, there is nothing

ARCHITECTURE



St. Mark's, Venice, 1042-71, seen from the square. An air view is shown on page 116. Radio Times Hulton Picture Library.



The arch and façade of the palace at Ctesiphon, showing the blind arcading used to give a pattern of shadow. The small arches had no structural function. Radio Times Hulton Picture Library.

exceptional about this building; certainly one finds no enlightened comprehension of arcuated construction. The small arches of varying sizes on the arcaded front have been used ornamentally, to intensify the contrast of light and shade in powerful sunlight. They have no structural significance.

An earlier building, the palace at Firuzabad, anticipates some of the features used at Ctesiphon. The architects who erected it in the second half of the fifth century displayed greater structural knowledge and resource than the architects of Ctesiphon, for the three domes in the centre were carried on pendentives, and the angles of the square hall were vaulted. Barrel vaults covered the small rooms that surrounded the open court. The main façade, as at Ctesiphon, had a tall arched portal, flanked by windowless walls decorated with blind arcading.

Such tentative experiments with the arch led nowhere, and the Sassanian palaces, like those built in Persia a thousand years before, relied on vast size and brilliant colour, though they lacked the decorative exuberance of the older buildings. The Middle East had lost architectural initiative. The dynamic West had recovered it at Constantinople.





Exterior of the mosque of Sultan Ahmed, the Blue Mosque, at Constantinople. Copyright Keystone Press.

CHAPTER ELEVEN

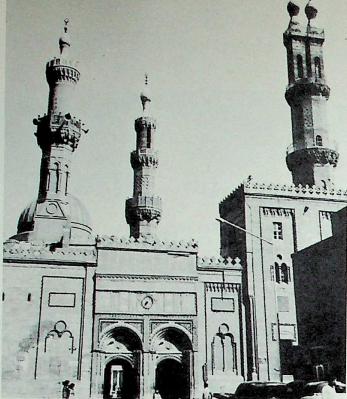
The Impact of Islam: Saracenic Architecture

Early in the seventh century Mahomet, 'the Prophet of God', founded a new religion, that Europeans call Mohammedanism but he called Islam or Hanifism, which spread and inspired the Semitic nations of the Middle East, giving them unity and a collective purpose. A holy book, the Koran, was compiled, embodying the revelations and injunctions of the Prophet, whose aim was the conversion of the world to Islam, if necessary by force. When Mahomet died in 632, Moslem power included all Arabia, Persia, Armenia and Syria. The Holy War continued until the Caliph, the Commander of the Faithful, ruled dominions from Turkestan on the north, with India on the eastern boundary, the whole of North Africa, from the Red Sea to the Atlantic, and all Spain except the small Kingdom of Asturia in the north-west. The Moslem army had poured up through Spain into France, and was defeated there in 732, by Charles Martel at Moussais-la-Bataille, between Tours and Poitiers, and pushed back behind the Pyrenees.

Europeans called these races, unified by Islam, the Saracens, and Saracenic is the term still used to describe the varied styles of their architecture, from Cordova to Delhi, from Samarkand to Cairo.

That architecture was basically affected by one of the injunctions of Mahomet, which forbade, like the second of the Ten Commandments in the Bible, the making of any graven image. This rule excluded the sculptor not only from architecture, but from the whole realm of representational art, concentrating his skill and that of the painter on the invention of geometrical patterns, interlacing and elaborate scrolls, that came to be known as arabesques, which covered surfaces with a sparkling, almost frenzied, ornamental gaiety. New, strange and restless forms spread through all the countries subjected to the Arab conquest, typical of the excitable, valorous and romantic temperament of the conquerors. The arch was used decoratively, often with an impulsive disregard of structural

Digitized by Sarayu Foundation Trust, Delhi and eGangotri. Funding: IKS



The mosque of el Azhar, Cairo, built circa A.D. 970. The variation of the minarets shows the resourceful inventiveness of Egyptian architects in handling this vertical form. Compare these, with their multiple galleries, with the slender, pencil-like minarets that surround Santa Sophia and the Taj Mahal. (See page 64.) Copyright Egyptian State Tourist Administration.

ARCHITECTURE

order and sense, so that arches of various shapes became openwork arabesques on a large scale, as in the great mosque at Cordova—curved, twisted, tangled, inverted and interlaced. There were horseshoe, round, pointed, stilted, ogee or keel arches (shaped like the inverted keel of a ship) and those with three, five or more cusps and foils.

Saracenic architecture acquired firmness, purity and repose in some parts of the East, but seldom in the West. Moslem buildings generally consisted of a series of façades, brilliantly decorated in colour, crowned with bulbous domes and cupolas. Such features could be added to existing buildings, and their interiors transformed, usually with borrowed material, for in the conquered countries classical or Byzantine structural forms were adapted and, in the process, fantastically disrupted. In Spain and North Africa, Egypt and Syria, Moslem architects at first disliked the look of the plain arch and vault and the massive stability of post-and-lintel construction: those old-established shapes, in which Greek thought still lived on, conveyed the reproof of reason for the whims of emotion. This disrespect for stable forms was apparent only in the earlier Arab buildings: the desert was still close, the austere simplicities of Arab life and zeal for the Moslem faith prompted the conquerors to rip precious materials from sacred and secular buildings and rearrange them like trophies, piling them into the new mosques they ran up everywhere. It was an architecture of loot. But from that haphazard mixture of looted materials, a style developed in each of the Moslem countries, unified by the characteristic decoration and ornament, though regionally varied in form.

The principal buildings were mosques, tombs, palaces and dwellings that came as close to the spaciousness and luxury of palaces as the wealth of their owners allowed. The early mosques had large open courtyards surrounded by arcades, resting places for travellers and pilgrims, with a hall on the eastward or Mecca side. These caravanserai

mosques were found wherever the Arabs had penetrated. In towns they grew more complicated: the big central courtyard of the caravanserai, or khan, shrank in size, and the surrounding buildings increased to several storeys, with many separate apartments, like a European inn. The interior of the mosque became increasingly the most important part.

Many towns and cities in the huge Moslem empire were ancient, ready-made for the conquerors to take over; some lost their former importance, many their architectural identity; for street plans became blurred and finally obliterated by the dwellings Oriental builders liked to crowd into a small space, without bothering about the relationship of one structure to another or the unity of the street. For example, in Anatolia the spacious Roman city of Ancyra became little more than a large village after it was taken first by the Persians, then by the Arabs, later by the Seljuk Turks, occupied and held for eighteen years by the Crusaders, and passing finally into the hands of the Ottoman Turks in 1360. The roofless remains of the white marble Temple of Augustus still stand; within the walls are the ruins of a Byzantine church; overshadowing them both is the mosque, Haci Bayram. Known throughout the middle ages as Angora, it is now Ankara, the fine, well-planned capital of modern Turkey, the new part forming a striking contrast with the huddled buildings in the old town.

One city, built throughout by Moslem architects, was planned and conceived by the Caliph Mansur, about the middle of the eighth century, on a site not far from Ctesiphon on the western bank of the Tigris. This new capital city, designed to protect the ruler, was the Baghdad of the Arabian Nights, where the Caliph Harun-el-Rashid used to prowl about at night in disguise seeking and finding adventures: a city that became within a few years of its founding, one of the wealthiest commercial centres in the East.

The plan was circular, four miles in circumference. There were three walls, the outer separated from the main or central wall by an open ring. Between main and inner walls lay the four quarters of the city; the inner wall enclosed a large open space, with the Imperial Palace in the centre, surrounded by administrative offices. Two roads cut the city into symmetrical quarters, piercing the walls at opposite points, and separating the four quarters.

This simple plan protected the Caliph Mansur from at least half the dangers that had formerly threatened him. The large space surrounding the palace allowed troops to manœuvre without any chance of being overwhelmed by a mob. The city quarters were dominated by the main and inner walls, and separated by the military barracks which lined the roads between the inner and outer gates. The suburbs were kept apart from the inner city by a deep moat, and the outer wall. The Caliph could leave without having to pass through any streets except those where his guards lived. Any riot could be localized at once, and by closing the inner and outer gates, the whole population could be imprisoned, so nobody outside the walls could get help from within, and no crowd could approach the palace without passing the guardians at the city gates. The police and the Caliph's agents could quickly reach anybody's house, and all public offices and official residences were centralized in one place, cut off from the population.

Nothing quite so efficient and far-sighted in the way of an architectural insurance policy against revolution had been planned before, and nothing like it was planned again

The Impact of Islam: Saracenic Architecture

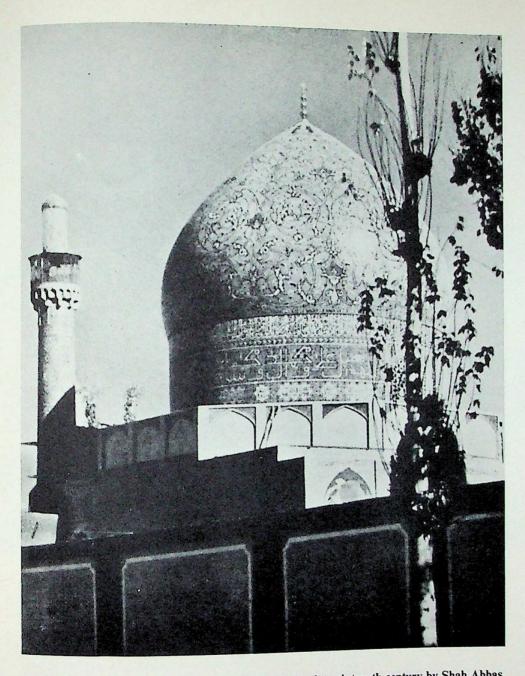
until Napoleon III, with the help of the Baron Haussmann, reconstructed Paris in the 1860s, with broad avenues and boulevards to afford an unobstructed field of fire for troops. Baghdad was an example of town planning designed to protect the government, without much care for the convenience of the inhabitants. Although plenty of open space existed, this was enjoyed chiefly by the Caliph. The capital did not set an example to other Oriental towns, which were generally a patchwork of tortuous streets, blind alleys, with large houses, and even palaces, rising amid squalid development, protected and hidden by high walls, and built round large open courts and gardens.

Every country converted to Islam freely interpreted the characteristic architecture of that faith which imposed no system of design to control proportions and ornament. Apart from the exclusion of human or animal figures, nothing except inexperience of structural methods deterred builders, and they soon acquired experience. There were six outstanding national developments of Saracenic architecture: Syrian, Egyptian, Spanish, Persian, Turkish and Indian. Of these the first three influenced European architecture, for the Western Caliphate in Spain was a distributing centre for Oriental art and learning, and from Syria and Egypt the Crusaders returned with new ideas about colour and ornament and the arts of life. Spain was the magnet that drew artists and craftsmen and scholars from all Europe, until the intolerant Spanish Christians gradually reconquered province after province, and finally crushed the Oriental civilization that, even when reduced to one small kingdom, was far in advance of the conquerors, and left a permanent mark on their architecture and language. Written history in the West has a Christian bias, which minimizes or ignores the artistic power and cultural achievements of the Arabs in Spain; but architecture records history without any religious or national loyalties, and from buildings still existing at Cordova, Granada and Seville, the accomplishments and standards of that most westerly of eastern civilizations may be read clearly.

The Great Mosque at Cordova occupies a site that has been sacred for centuries. A temple of Janus stood there when Spain was a Roman province, and this was replaced by a large Visigothic church, St. Vincent's, built in a mixture of the late Roman and Byzantine styles. The Moslems did not plunder or demolish this church: in a civilized spirit of toleration they bought part of it, allowing the Christians to keep one end, while they used the other as a mosque. In 785, the Emir Abd-el-Rahmān bought the rest of the building, and Christian church, with nineteen aisles, running north and south, each aisle with thirty-three bays, and the whole structure, which is only thirty feet high, supported by 1,200 wide. The columns of porphyry and coloured marbles taken from older buildings are support the intertwined arches, with their alternate quoins of red and white. The interior excited by rich materials which they could assemble with gusto but with no thought beyond producing a rich effect.

Moslem builders showed far more constructional ability when they erected the mosque at Seville. In 1196, Jebir, the architect to Yusuf I, designed the great tower, 45 feet

ARCHITECTURE



The Dome of the Great Mosque at Isfahan, built in the late sixteenth century by Shah Abbas. Colour dominates form, for the building is clad in tiles of brilliant blue and green. Copyright Professor Upham Pope.



Gardens, lakes and fountains were all part of a grand composition in the Persian palaces of the seventeenth century, and tall loggias flooded the exteriors with shadow, like the palace of Chahil Suntan at Isfahan, where new grace is given to an ancient architectural form. Copyright Professor Upham Pope.

square and 230 feet high that terminated in a platform supporting four huge balls of brass. That tower, the Giralda, which stands at the north-east angle of the Christian Cathedral that replaced the mosque, is not apparently a minaret, but a piece of sheer architectural exuberance. Only the lower part, to the height of 185 feet, now retains the delicate Moorish decoration; for the top was demolished in 1568 and an open bell chamber added, with diminishing stages above and a bronze figure representing Faith crowning the belfry.

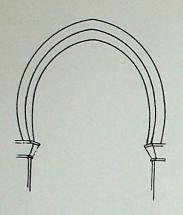
At Granada the Alhambra, built between 1248 and 1354, is part of a royal pleasure palace, where some of the magical quality of the palaces described in the *Arabian Nights* haunts the arcades and courts. The stucco ornament on a wood base sparkles; the slender columns, alternately single and coupled with stalactite capitals, are not borrowed from other and older buildings; their delicate proportions and enrichment are expressly designed as parts of a fine decorative composition. The oblong Court of the Lions, 116 feet by 66 feet, has a fountain with twelve lions of white marble supporting an alabaster basin: in the Court of Alberca, 140 by 74 feet, a large fish pond is set in the marble pavement. The Alhambra, with its courts, halls, baths, bedrooms and summer rooms, displayed to medieval Europe standards of luxury that were not even memories in the Christian lands north of the Pyrenees.

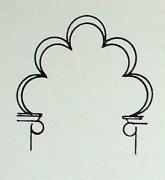
In Arabia, the birthplace of Islam, there was no tradition of temple building, and the followers of the Prophet felt no urge to build for their faith until they became warrior missionaries with conquered populations to convert. Apart from the Great Mosque at Mecca, there is no distinctive Arabian variation of Saracenic architecture. In Syria the early mosques were converted Christian churches, rebuilt, enlarged and enriched in the course of centuries. The Dome of the Rock, sometimes incorrectly called the Mosque of Omar, dates from 688, and stands on the Temple platform in Jerusalem: an octagonal building with a ribbed central dome, rising from a drum, with Roman columns and Byzantine capitals used in the interior. Persian tiles brighten the exterior, and marble slabs cover the internal walls; but these date from the second half of the sixteenth century. Also on the Temple platform, probably occupying the site of a sixth-century basilican church built by Justinian, is the Mosque-el-Aksah.

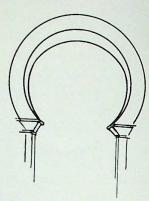
In Egypt, the oldest mosque is that of 'Amr in Cairo, which was built a little to the north of a Roman fortress in 641 to 642, a simple, unpretentious structure, since rebuilt and enlarged, with arcades supported by classic columns removed from older structures. From the tenth to the fifteenth centuries, the magnificent mosques of Cairo displayed the increasing competence of Egyptian architects, who gave new graces to domes and minarets, and recognized that richness of decoration was not an end in itself. This phase of Egyptian Saracenic architecture was ended by the influence of the Renaissance, which, as we shall see in Chapter 18, had a disruptive effect on the native style of every country in Europe and many non-European states that were in contact with the West.

Persian Saracenic inherited some dim traditions of Assyrian and Babylonian palace building but nothing remains of the voluptuous palaces of Mansur's Baghdad, though the octagonal tomb of Zobeide, the favourite wife of Harun-el-Rashid, stands outside the walls, crowned by a pyramidal roof—a forlorn survivor of the wars and invasions that afflicted the country in later periods. Although Persia was conquered by the Arabs in

The Impact of Islam: Saracenic Architecture





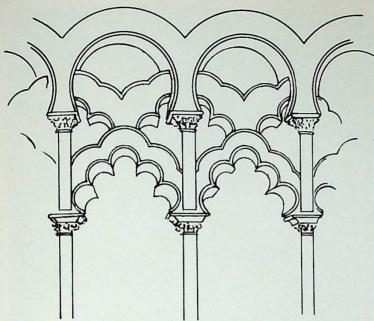


Saracenic arches: pointed, multifoil and horseshoe.

ARCHITECTURE

641, there are no mosques earlier in date than the beginning of the thirteenth century. The oldest, at Tabriz, is uncharacteristic, planned like a Byzantine church with a central dome; and the walls, inside and out, are adorned by brilliantly coloured tiles. The Great Mosque at Isfahan, built in the late sixteenth century by Shah Abbas the Great, depends almost entirely on the glowing blues and greens of the tiles which cover the surface, which is pierced by pointed arches of varying sizes and shapes, and overtopped by a tall, bulbous dome. Colour is in ascendancy over form, and binds into an imposing composition the huge pointed arches, the dome and the minarets. This tile-clad building is a direct architectural descendant of the monumental royal structures that, two thousand years earlier, had flaunted the wealth, power and dignity of the Persian monarchs. During the early seventeenth century, under the Shah Abbas, Isfahan became the most splendid city in Persia: mosques, palaces and great houses displayed a fresh mastery of design and far greater restraint in decoration. Gardens with fountains surrounded the buildings, lakes stretched before tall loggias cooled with shadows, like the palace of Chahil Suntun, and everywhere architects planned town houses to secure the maximum amount of shade, with the chief apartments grouped about a central courtyard, facing inwards. Sometimes one façade would open on to a street; but usually streets and narrow alleys in Persian cities ran between high white walls which guarded the privacy of large and small dwellings.

North of Persia, in Turkestan, the tombs of Olja Aim and Bibi Sineb at Samarkand, illustrated a new, harmonious relationship between horizontal and vertical forms, which inflated form of domes and cupolas, which give them an air of impermanence. On these tombs the turquoise domes rise from tall, circular drums: rotund and calm. Untroubled stability is proclaimed by purity of line and structural frankness.

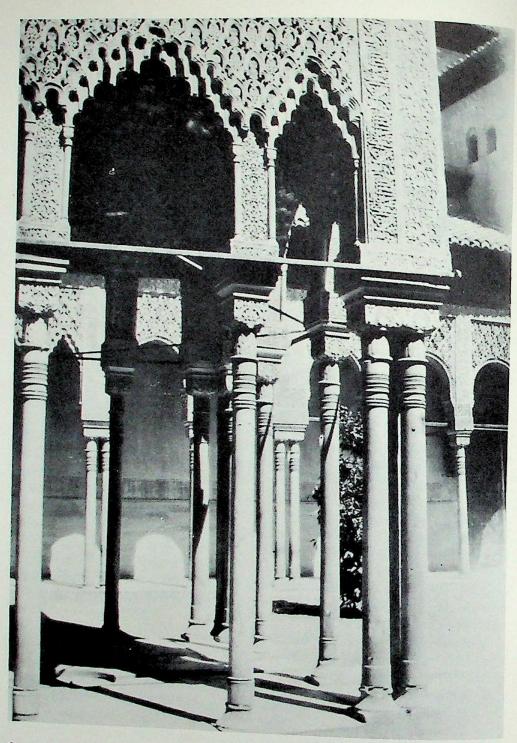


Early Arab architecture was restless and formless: a feverish muddling together of fragments looted from classic buildings supporting, like these mutilated Corinthian columns, an open-work arabesque of horseshoe and multifoil arches, without structural sense or order.

Turkish Saracenic was strongly influenced by Byzantine buildings, and before their conquest of Constantinople in 1453, the Ottoman Turks had built fine mosques, notably at Brusa, in Anatolia, inland from the Sea of Marmara, where Yeshil Jami, the Green Mosque, dating from 1430, was cruciform in plan and built on the site of a Byzantine church. But it was at Constantinople, renamed Stamboul by the conquerors, that Moslem architects were inspired by the dome of Santa Sophia. The great church was converted to a mosque, the mosaics covered with whitewash, but the structure unharmed. Four minarets were added. Other churches were converted, and nearly a century after the city became Turkish, the great mosque of Süleyman the Magnificent was designed by Sinan, an Armenian architect, and built from 1550 to 1555, with a central dome 86 feet in diameter and 156 feet high, carried on pendentives resting on tall, slightly pointed arches. Windows with stained glass of intense glowing dark blue, deep ruby and orange yellow, play shafts of coloured light over marble wall linings and Persian tiles; but there is comparatively little tiling or mosaic. In medieval Christian churches the coloured windows were a form of picture writing: in this mosque the windows are used purely for enrichment. The results are similar.

In the mosque of Ahmed, the Blue Mosque, built from 1608 to 1614, the central dome is supported by four huge fluted pillars, of great girth, and beautiful proportions. The interior is covered with mosaics and blue tiles, and some of the windows have stained glass, dating from the eighteenth century. The arches are shallow, pointed, and some of the small ones have alternate quoins of red and white like those in the mosque at Cordova, but under much better control. The architect, Sedefkar Mehmet, created a spacious, glowing interior where colour predominates, though not at the expense of form.

The Impact of Islam: Saracenic Architecture



Court of the Lions opposite, and detail of the decorative arcading, above, at the Alhambra, Granada, built between 1248 and 1354. This royal pleasure palace has some of the magical quality of those described in Arabian Nights. Photographs by the author.



Saracenic architecture in India acquired a mellow perfection, far exceeding in beauty the achievements of Moslem architects in other countries. The three main divisions of Indian architecture, Buddhist, Jaina, and Hindu or Brahman, are described in Chapter 14, but we may note here that when Saracenic architecture came to India from Persia, entirely new conceptions of form and decoration were introduced to a country where building traditions, established for over a thousand years, were fundamentally different. In the early Pathan Dynasty, which lasted from the end of the twelfth to the middle of the sixteenth century, though some of the features of Jaina temples were adopted, such as colonnaded courts, the spontaneous inventiveness and vigorous originality of the designers of such great buildings as the Kutub Mosque at Delhi—the city that became the capital of the Moslem empire in India-were apparent. Under the Mogul Dynasty, which lasted from 1526 to 1857, the whole genius of a people was poured into architecture. During and after the life of Akbar, the greatest and wisest of the Mogul emperors, who reigned from 1542 to 1605, the Mogul Court had attracted the finest architects, artists and craftsmen in India. Akbar, the famous soldier and statesman, was also a masterly architect, who founded a splendid city near Agra, at Sikri, formerly a village until the Emperor decided to hold his Court there. This city was completed in the course of fifteen years, with an artificial lake six miles long and two miles broad on the north-west side, reflecting the exquisitely proportioned palaces and pavilions. The Emperor abandoned it, and the deserted ruins bear witness to his extravagant genius.

The Impact of Islam: Saracenic Architecture

Under the Mogul Emperors a new phase of constructive ability gave buildings a crisp elegance of line; eager patronage for architecture came from the rich nobles, whose palaces had a bright splendour, untinged by the vulgar lavishness of Oriental palaces in the ancient world. Superficially, the taste of the Mogul Emperors for erecting monumental tombs resembled that of the Egyptian Pharaohs—but with this difference: the Moguls built palace-tombs which were gay, festive, graceful in form, surrounded by gardens and fountains, and used as places to be enjoyed during their lifetime; the Egyptian tombs were sombre with foreboding, revealing their preoccupation with life after death. The Prophet's prohibition about using human or animal figures was generally observed, and this gave a singular purity to ornamental patterns, infinitely varied, largely geometric, and devised to give subtle emphasis to the decorative properties of materials.

The masterpiece of Indian Saracenic architecture is the Taj Mahal, at Agra, begun in 1630 and completed in eighteen years. Built by Shah Jehan, the grandson of Akbar, as a tomb for his wife, Arjumand, this white marble mausoleum has a perfection of form and colour that fulfils the wish of the grief-stricken Emperor that it should be one of the wonders of the world. (See coloured plate.) Nothing conceived by Islamic architects before or since surpasses it.

The story of architecture was changed by the impact of Islam, both in the east and the west, and although the inspiration of Saracenic architects and builders was ultimately weakened by the classical Renaissance in Europe, the lightness and grace and understanding of colour values remained, and they reappear wherever a mosque is built for a Moslem community.

ARCHITECTURE

CHAPTER TWELVE

Romanesque Architecture

After the political extinction of the Western Roman Empire, Europe entered a Dark Age, emerging only when medieval civilization began. During that time of transition a new dynamic architecture called Romanesque evolved in Italy, France, Germany and England, derived from the structural character of Roman buildings, not from the classic orders. The round arch, barrel-vault, cross-vault and dome were used, their powers and purpose openly displayed; materials were employed with a new respect for their properties and limitations, not forced into pre-conceived shapes. This sympathetic handling of materials marked the beginning of a new independence among craftsmen. In the Roman world they had been skilled hands, nothing more, working under inflexible rules; now their imagination and individuality were released.

Technical ability had survived the fall of Rome, but opportunities for builders were limited. They were occupied in patching up existing work and strengthening defences; fortifications were in demand; only the Church could sponsor new building ventures in an unsettled world. So early Romanesque was largely church architecture, based on arcuated construction and an exclusive use of stone. Meanwhile domestic building had slipped back to primitive simplicity in the lands overrun by the barbarians, whose tribal chiefs had carved out kingdoms and principalities from the old Roman provinces. They had no use for towns or luxurious Roman country houses. They settled down as farmers, living a grubby communal life in large timber-built halls, with sleeping benches round the walls, a central hearth with a hole above in the thatched roof to let out smoke, and shuttered slits for windows. Those wooden halls of the sixth, seventh and eighth centuries were the forerunners of the Great Halls of medieval castles and manor houses and their structural forms were continued in barns and cottages for fifteen hundred years.

The land-hungry sea rovers from Scandinavia and Jutland, who raided the coasts of



The baptistery, cathedral, and campanile at Pisa. The baptistery, 1153–1278, has later Gothic additions above the arcading. The cathedral, 1063–92, and the campanile—the Leaning Tower—1174, form with the baptistery one of the most famous groups of buildings in the world. The proportions of the columns and arches show that Italian architects had not forgotten the classic orders. Copyright Italian State Tourist Office.

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S. Miniato, Florence, 1013. Here the link with the Roman past is obvious: the columns from which the arches spring are delicate versions of Corinthian columns. *Photograph by Richard C. Grierson.*

Europe, turned Roman Britain into England and founded what became a Norman Empire, were highly-skilled shipwrights and knew how to choose timber for structural work. Where they settled, a partnership grew up between the woodman who selected and felled trees, the carpenter who converted them and the builder who used the timber for ships or houses. In the large forests of Europe and Britain, it was easy to find limbs that curved naturally, so timber uprights called crucks, bent for roughly a third of their height, could be set up, joined at the top by socketing them into a horizontal beam, and an arched roof formed without central supports. This produced a house that looked like an inverted boat, the roof ridge corresponding to the keel, the crucks to the ribs. (The term keel is still used for an ogee type of pointed arch.) This system of timber framing was used for halls and some of the larger houses of a village; and from such simple beginnings, an architecture of wood was developed in the course of centuries, perfected in the northern European countries, and seen at its best in the magnificent timber roofs of the Middle Ages.

A description of a seventh-century church, constructed of oak and walled with reeds, was recorded by the historian Bede. This was built on the isle of Lindisfarne off the coast of Northumberland in 652, and walls and roof were at a later date covered with lead plates. The Abbey buildings at Wearmouth seem to have been of more permanent materials, for in 675 the Abbot, Benedict Biscop, sent to France for glass-makers to glaze the windows of the church, cloisters and dining rooms. In the kingdom of Northumbria, which then extended from the Humber to the Forth and eastwards to the Lancashire coast, a brilliant and artistic civilization flourished in the seventh and eighth centuries, which was wiped out in the ninth and tenth by Danish raids, so no evidence exists to show whether a preliminary version of English Romanesque had appeared there.

Romanesque Architecture

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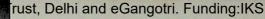
The chancel arch, Wittering Church, Northamptonshire, tenth century. The Roman province of Britain had been dead for 500 years, but enough ruined buildings remained to influence the structural ideas of Saxon builders. National Buildings Record.

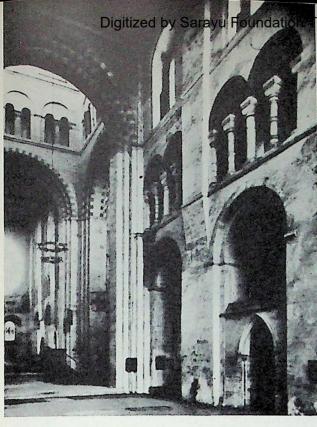
ARCHITECTURE

In Italy and France, Romanesque developed and matured from the eighth to the twelfth century, in Germany from the eighth to the thirteenth, in Spain the Arab conquest stopped development, and in England it was delayed until the ninth and tenth centuries and perfected in the eleventh and twelfth by Norman builders. All these variations of Romanesque forecast the breaking up of united Christian Europe into separate nations. While Italian, French, German and English Romanesque buildings shared a common relationship to such functionally frank Roman structures as aqueducts, bridges, town gateways, towers and walls, and owed something to Byzantine influences, they had a distinctive national character.

Italian architects were closer to their Roman predecessors than other Europeans: the monuments of Rome remained; the classical tradition was never out of sight or out of mind; and Byzantine ideas with their Oriental flavour came from the still living remnant of the Empire and reached Italy first. In the north, centre and south, and in Sicily, characteristic forms evolved—lighter and more graceful than other European interpretations of Romanesque: although the arch was used structurally, it was not always exhibiting its weight-lifting powers, like a professional strong man displaying his muscles; and the decorative elegance of arcading was discovered. The arcading on the Sassanian palaces at Firuzabad and Ctesiphon, described in Chapter 10, was a feeble anticipation. Superimposed arcades rose to the gables, cooled exterior walls with round-headed shadows, and accentuated the delicate proportions of such buildings as the famous group at Pisa, the Cathedral, Baptistery and Campanile. (See page 90.) One of the distinctive features of Italian Romanesque churches is the bell tower, or campanile, standing alone, though sometimes connected with the church by cloisters.

The classic orders were never forgotten in Italy. For example, the six columns on the





Transept and crossing at St. Alban's Abbey, Hertfordshire, 1080-90. Saxon and Norman builders had worked on the Abbey and materials had been quarried from the ruins of Verulamium, the near-by Romano-British city. Photograph by Herbert Felton.

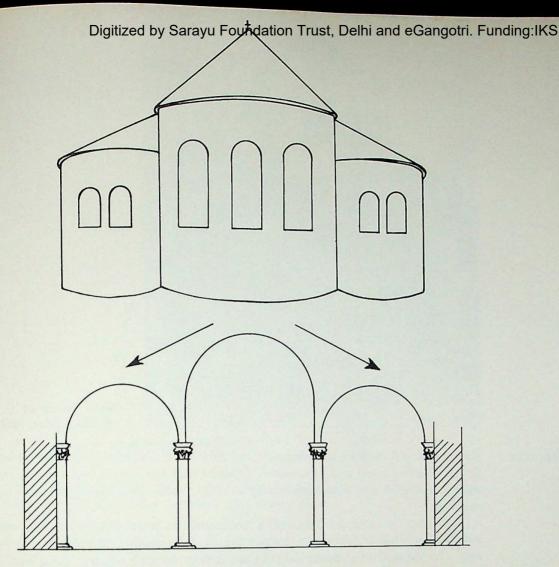
façade of St. Miniato, Florence, shown on page 91, are slender versions of the Corinthian order, and the decoration of that church inside and out has a pagan vivacity. Civic architecture rivalled that of the church, and in Milan, Florence, Pisa, Genoa and Verona, splendid public buildings, palaces and great houses showed how an artistic and gifted people pursued beauty with a zest that gave to everything they built a sureness of touch and a fabulous vitality. In Venice even the warehouses of merchants were adorned with exquisite arcading, for in the Italian city states neither ignorance nor misunderstanding separated the business man from the artist: both recognized and respected the importance of their jobs in a highly civilized community.

In France, Romanesque was structurally experimental: 'the Architecture of Adventure', as Lethaby called it, was arising. The Roman barrel vault was developed and enlarged to cover the naves of churches in place of a wooden roof. This load of stone demanded stronger supports than columns, so stout piers were used. The side aisles of churches were vaulted, too, so throughout its length the weight of the main vault above the nave was partly distributed by the aisle vaults. At the eastern end of the church, the thrust of the nave vault was taken by an apse and that of the aisles by smaller apses. So three semicircular structures, corresponding in width to the nave and the aisles, held up one end of the building: at the other, the entrance porch was enlarged and strengthened and flanked by two towers, so the thrust of the vaults was stabilized by a great mass of masonry, and those western towers became a feature of French Romanesque and Gothic churches.

The function of a mass of masonry as a thrust-absorber led to the building of buttresses against walls to resist the pressure from within of an arch or a vault. The halfbarrel vaults over the aisles of a church were thrust-absorbers of a lighter kind, carrying Romanesque Architecture



The nave of Ely Cathedral, mid-twelfth century. Ely and Durham were the finest examples of Anglo-Norman architecture. National Buildings Record.

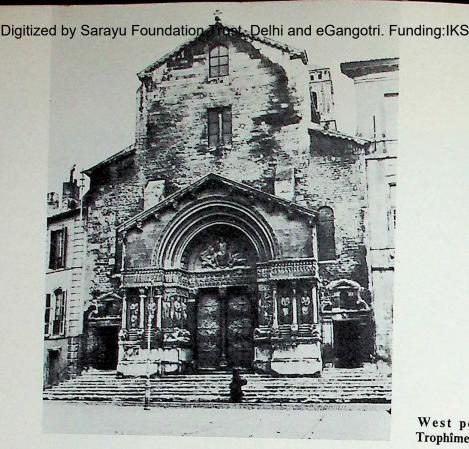


Section through nave and aisles of a church, with the barrel vaults ending in a triple apse.

down the pressure of the nave vault by a semicircular path to the side walls. The next step in this method of maintaining structural equilibrium was to build an independent pier with an arch curving up from it to join the outside wall, redistributing the pressure from within and relieving the side walls from the full force of cumulative thrusts. This device was called a flying buttress.

Vaulting followed two different lines of development: the continuous barrel-vault, as at Notre Dame du Port, Clermont-Ferrand, or a series of domes, like those at St. Front, Périgueux, a church built in 1120 on a Greek Cross plan, covered by five spheroidal domes, Byzantine in form and resembling St. Mark's at Venice. Although vaulting with domes spread to other parts of France, the barrel-vault was used more frequently. In many regions Roman methods were followed, without deliberate imitation, but merely because the ancient examples were there, inescapably impressive, particularly in the Rhône valley. The west porch of St. Trophîme at Arles, for instance, recalls the form of a Roman triumphal arch. But dynamic invention was far more characteristic of French Romanesque

Romanesque Architecture



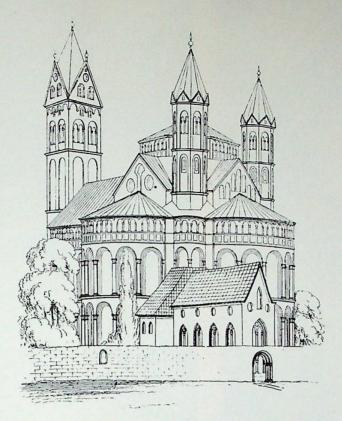
West porch of St. Trophîme, Arles, 1150.

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than unconscious imitation and adaptation, and the use of the barrel-vault produced other forms. Where two such vaults intersected, a groined vault was formed, and as the groins tended to be weak they were reinforced by an arch or groin rib, and this originated rib vaulting.

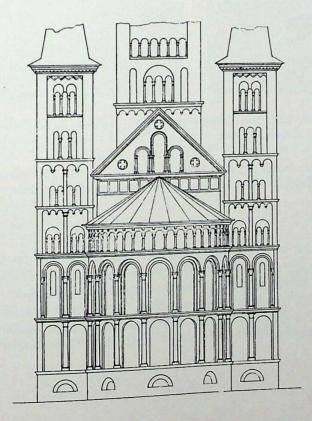
In Normandy a style arose that was a proclamation in stone of power, strength and stability. Every line of Norman architecture suggested the virility of the ruthless Northmen, who had established themselves in France early in the tenth century. Those Northmen, Normans as they were soon called, adopted the language, laws and social customs of France and their massive churches and castles rose wherever they conquered and settled, from England to Sicily. 'We are the masters now!' said the arrogant castles with their high square central keeps. 'We are at one with the state', said the fortress-like cathedrals and abbey churches.

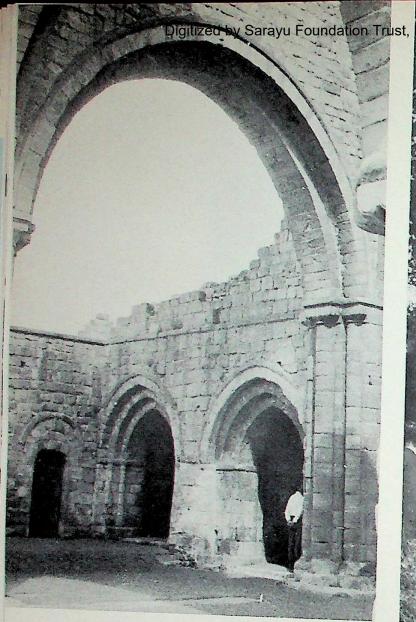
At Caen one of the finest examples of Norman architecture is the nave of the Abbaye-aux-Hommes, known as St. Etienne, founded by William the Conqueror and begun about 1070, but the greatest triumphs of the style were the Anglo-Norman cathedrals and abbey churches. Before the conquest of 1066 Norman influence had penetrated England and Norman masons were grafting their ideas on to the native English version of Romanesque, for since the late eighth century stone churches had been built in the Anglo-Saxon kingdoms of England. In Northumbria they had been destroyed or their remains incorporated in later buildings, like the crypt at Hexham Priory; but in other parts of the country some Saxon work survived, like the late seventh-century church at Brixworth, Northampton-shire, where semicircular arches of Roman brick are used and Roman brick and tile incorporated in the structure. Many of the deserted Romano-British towns were still standing when that church was first built; although they were used mainly as quarries

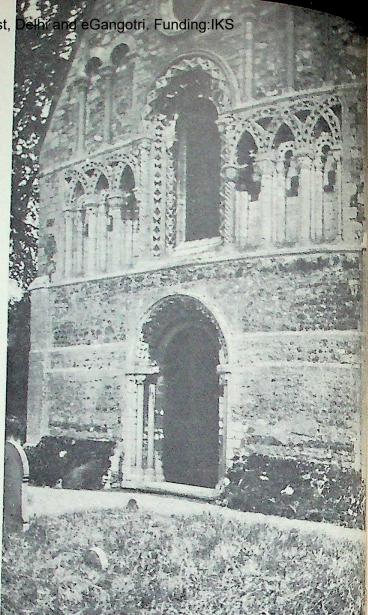


Above: The east end of the Church of the Apostles, Cologne, showing two of the three apses.

Below: The east end of Bonn Cathedral. After Thomas Hope.







Left: The pure, bold, undecorated Norman arch. Buildwas Abbey, Shropshire, circa 1150. Photograph by Daniel Nicholas.

Right: The west façade of Castle Rising, Norfolk, circa 1160. The interwoven arcading gives a sparkling effect: Saracenic influence is obviously travelling west. Photograph by the author.

for materials, no builder could ignore or fail to be influenced by the competence of their construction. The few Saxon churches that remain are simple buildings without frills, and marked by a straightforward use of the arch, as at Bradford-on-Avon, Wiltshire, where an eighth-century building, which was probably remodelled later, has shallow recessed arcades banding the exterior, and at Wittering, Northamptonshire, where a tenth-century building strikingly displays the bold lines of the classical arch (shown on page 92).

The policy of the Normans was to play down Saxon achievements and break Saxon pride; so existing churches were re-built and tombs and inscriptions defaced as routine tasks of political propaganda. At the end of the tenth century the Saxon abbots of St. Alban's, Ealdred and Ealmer, began to break up the near-by ruins of the Roman city of verulamium to obtain materials for a new Abbey church. The building proceeded slowly, and was finally finished in 1077 by Paul of Caen, the first Norman Abbot, who then destroyed the tombs of his predecessors. Saxon vision and Norman energy and competence contributed to the building of St. Alban's Abbey, but there was a much older contributor—the traditional memory of Roman skill.

Durham, Ely, and Winchester cathedrals, Tewkesbury Abbey and the ruins of Buildwas and Fountains, all show the mastery of Norman builders, who never allowed the purity of structural lines to be disturbed by unnecessary or inappropriate decoration. Arches were piled on arches, arcades were interlaced, the arch form and the massive cylindrical piers were serene statements of stability. Those piers and arches were never ponderous, whether they were marching down some vast nave, or casting their shadows across the interior of a little country church. In every building the idea of power was conveyed: either that of the Church or—in castles and fortresses like the Tower of London—the King's.

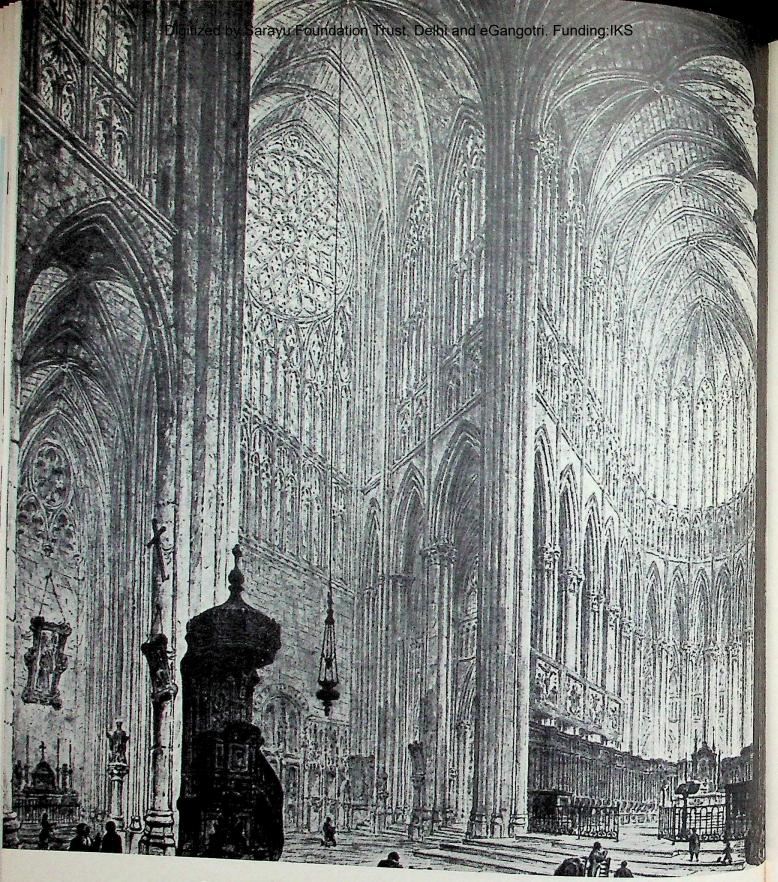
Manor houses like castles were fortified, and although the great hall was built of stone and occasionally had a stone-hooded fireplace and a chimney instead of a central hearth, little advance was made in comfort. Town houses were occasionally of stone, some of which have survived in England and Normandy though their original form is almost lost by later additions; but as most of the houses were of wood, they were periodically destroyed by fire.

The likeness of German Romanesque to Lombardic architecture in the use and treatment of the arch reflected the political and cultural relationship that existed between Germany and Italy. Though the structural frankness of Norman building is lacking, there is a greater variety of form, and a picturesque grouping of features. Circular and octagonal turrets, polygonal domes, and arcaded galleries running below the eaves produce conflicting angles which often give a restless air to some churches. Where Italian Romanesque is gay, German is sometimes confused by competing horizontal and vertical lines. (This is apparent in the Church of the Apostles, Cologne, and in Bonn Cathedral, both shown on page 97.)

German Romanesque churches had an apse at the western as well as the eastern end, which deprived them of that most distinctive feature of French Romanesque, the west porch. In the Church of the Apostles, Cologne, the choir terminates in three apses, so at the east end of the church those three apses and the curved bases of the twin towers form five semicircular external features which melt into each other.

The experience accumulated during the Romanesque period brought greater confidence to architects in Western Europe. By balancing the play of forces in their structures, controlling thrust and counter-thrust, they could achieve equilibrium and elasticity, so a building no longer sat inert on the ground like a pudding on a plate, but stood up, tall, splendid and secure, without needless bulk.

Romanesque Architecture



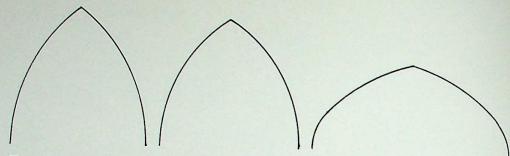
Interior of Beauvais Cathedral, one of the most splendid and courageous works of French Gothic, with a sled loftiness unmatched by any other European building. The cathedral was begun in 1225, and work continued it was completed in 1568. The roof collapsed in 1284, and the choir was reconstructed and strengthened between 1337 and 1347. The transepts were not built until the sixteenth century, and the building was never finished of the transepts. From a drawing by J. Coney, made about 1829 and reproduced by courtesy of the Victorial Albert Museum.

CHAPTER THIRTEEN

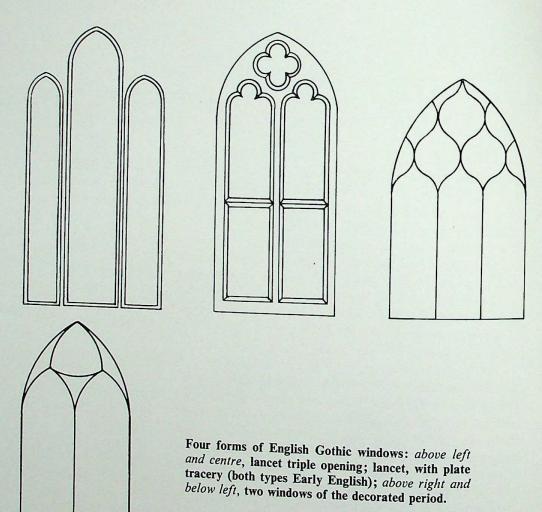
The Gothic Achievement

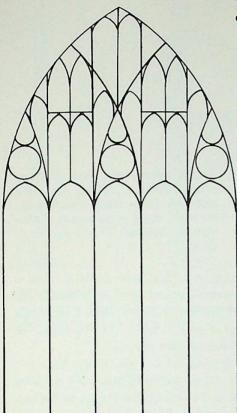
Gothic architecture evolved from Romanesque, first appearing in France in the middle of the twelfth century, then developing in England, Germany, the Low Countries, Scandinavia, Italy and Spain. Everywhere this new, dynamic architecture released an almost explosive spirit of adventure, as fully charged with excitement and energy as the early Moslem work; the excitement did not come from conquest and loot, but from structural discoveries, and the energy was controlled by master-masons with a long tradition of skill behind them. This was the architecture of medieval civilization. The name Gothic is misleading, because the Goths who had invaded and conquered large parts of the Western Roman Empire seven hundred years earlier had nothing to do with it; the term, unknown in the Middle Ages, was first used in the sixteenth century by the Italian art historian, Giorgio Vasari.

The Gothic architects started a structural revolution. They built like engineers, solving individual problems with methods and materials that suited the job, and rejecting the Roman rules of Vitruvius, though they knew about them, for the books of Vitruvius have come down to us from medieval manuscripts of which many copies were made. Only Italian architects looked over their shoulders at the classic orders; the others, unhampered by any universal system of design, changed the whole nature of building construction. They were neither pious amateurs, improvising solutions in an emotional frenzy like the Arabs in Spain, nor churchmen doing a spare-time building job, but highly trained professional designers taking calculated risks with stone—a material that invited structural experiments. The Romans had imprisoned the arch: the Byzantines liberated its powers and the hitherto hidden secrets of its strength and flexibility were mastered. Trial and error—and there were occasional errors—brought new knowledge of what could be done with wood and stone. Towers fell, roofs collapsed, and arches caved

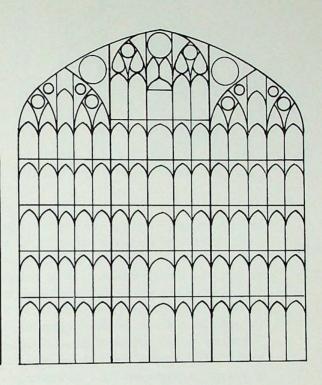


Three forms of Gothic arch: left, lancet; centre, equilateral; right, elliptical—the curve described from three centres.





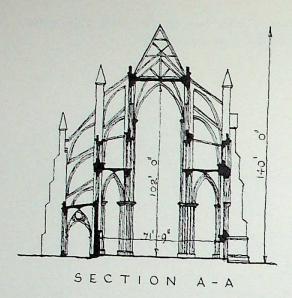
Tracery of the Perpendicular period, when windows expanded to an enormous size.



in—not always because a fresh technique was being tried out: in some of the French and English cathedrals, carelessness and cheap construction were the causes. These occasional disasters encouraged new enterprises: later ages might be content with repairs but not medieval churchmen and their architects. Cathedrals and abbeys were enlarged and re-built without any sentimental respect for old work: that was pulled down to make way for new. Nobody cherished ruins. A disused castle was not thought of as a romantic pile to be preserved: it was a quarry, like William the Conqueror's Castle at Cambridge, which supplied material for the college builders in the fourteenth century. The idea of copying an old building never occurred to anybody.

Increased knowledge of the capabilities of stone and wood changed the character of design. Compared with late Romanesque buildings, particularly the Anglo-Norman cathedrals with their stout piers and rounded arches, Gothic churches were strikingly slender. Their builders had no fear of tension; they dispensed with needless bulk, employing a lithe, muscular structure to carry weights over voids and distribute thrust through flying buttresses; from the carved capitals of tall, delicate columns, a web of radiating ribs and arches rose high above nave and choir and transepts. Columns and arches seemed

The Gothic Achievement



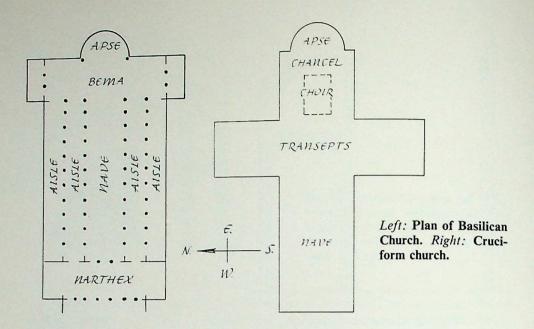
Section through the nave of Westminster Abbey, showing how the buttresses act as thrust-absorbers for the vault, which is the highest Gothic vault in England. Drawn by A. S. Cook.

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to spurt upwards, like jets of water, and this emphasis on vertical lines created an illusion of ascent. Some of the Gothic cathedrals had an enormous and spacious loftiness. The vault at Beauvais, the highest in Europe, was over 157 feet, some three and a half times its span, with the thrust taken by flying buttresses of great strength. The nave vault of Westminster Abbey was 102 feet—the highest in England. (See above.)

Windows grew larger and larger in France and England and Central Europe, becoming vast transparent pictures of coloured glass, divided and supported by thin stone mullions and tracery, like the window of the south transept in the cathedral at Prague or the east window of Gloucester cathedral, on page 114. Solid walls shrank correspondingly in area until a church was like a tall stone cage—a colossal lantern of stained glass. The artists and glaziers who designed those high, glowing windows had to tell the story of the Christian faith to people who, apart from a few churchmen, could not read. The message of the windows was repeated by wall paintings; symbols and reminders of the faith were carved on roof beams, choir stalls, pew ends and the rood screen that separated nave from choir.

Some churches built on the plan of a cross may have been a symbol on a gigantic scale, for many in Europe and England had an angular twist, with the chancel inclined either to the right or left, out of line with the nave. This change in alignment, which bends the eastern limb of the church to the north or south, is supposed to symbolize the figure of the crucified Christ, with His head inclined to the left or right. In England, Lichfield cathedral is the most famous of these deflected buildings, with the inclination to the north; York, Ely, and Canterbury incline to the south. There are other explanations to account for this bent plan. One theory is that the builders desired to make the choir fade out of sight, so together nave and choir would seem much longer than they really were—a perspective effect as deliberately contrived and as carefully calculated as the optical were unable to set out a church accurately: but this denies the indisputable technical



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competence of Gothic masons, who certainly knew how to build straight. Accident is less likely than design, especially as symbolism had a profound significance for medieval Christianity.

Sculptors were active partners in the team of artists and craftsmen who built and adorned Gothic churches. They worked with individual skill and invention, but never stole the show like the Hindu sculptors described in the next chapter, for their carvings were related to a structurally mobile design and were not used to give an air of mobility to a static mass. Saints and angels looked out from porticoes and towers or gazed down from roof beams; imps and fabulous creatures abounded; ornament appeared everywhere—on the crockets of spires and pinnacles, on the tabernacles: those canopied niches that sheltered the statues—and on the bosses covering the point where the ribs of a vault met. Gleaming white walls and towers rose up in every town and throughout the countryside, for in England the cathedrals and churches were coated with lime to preserve the stone surfaces. Churches, abbeys, castles, fortified manor houses, town houses, city halls and guild halls showed the diversity of form that followed an ever-increasing mastery of structure and materials.

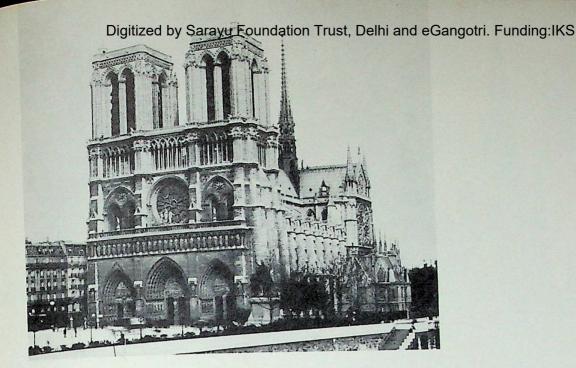
Castles were mainly examples of brute strength, with walls twenty feet thick, surrounded by a moat, or perched on an island in a lake or river, or commanding the summit of a hill. A drawbridge crossed the moat, with a massive gateway behind it, protected by the iron grille of a portcullis which descended from the gate-house when the drawbridge was raised. This gate-house had a barbican, a fortified tower, with projecting bartizans, or hanging turrets, and was a self-contained strong-point. Behind the moat was a curtain wall, the first line of defence, guarded by towers, and behind that was the main wall with towers and semicircular projections called bastions, and between the walls was a space



Pevensey Castle, Sussex, originally the Roman fortress of Anderida, rebuilt and strengthened by the Normans, who constructed the keep and the massive round towers. The ruins today include additions made in the thirteenth century. From a reconstruction by Alan Sorrell, reproduced by courtesy of the Ministry of Works, Crown Copyright reserved.



Albi Cathedral, begun in 1282, massive, compact and supported by its strong walls, without weight-distributing buttresses. French Government Tourist Office.



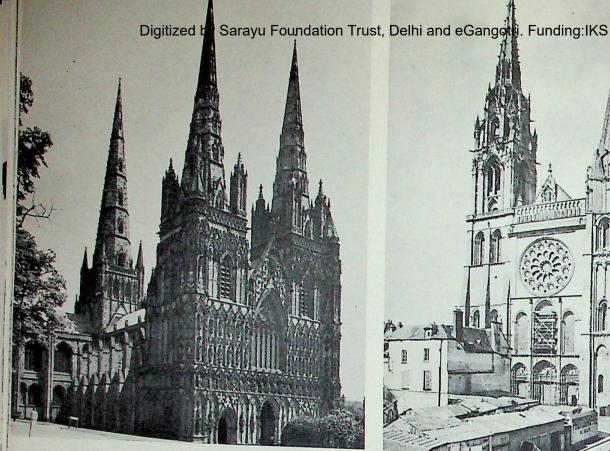
Notre Dame, Paris, 1163-1235, showing the twin towers of the west front, and the rose window of the south transept. Reproduced by courtesy of the Mansell collection.

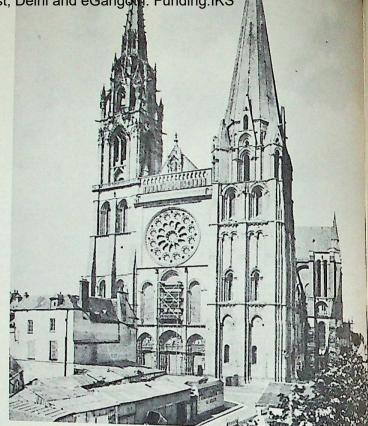
called the outer ward. Behind the main wall was the inner ward, with the great hall, other living quarters and store houses, a chapel and a strong central tower, the donjon or keep, which could still hold out when both walls had been scaled and both wards occupied by an attacking force. The plans and size of castles varied greatly; their defensive efficiency was improved in the twelfth century after the return of the Crusaders who had been influenced by the experience of Byzantine engineers when they built castles in Palestine. Some were of enormous size, like small walled towns, with residential towers and blocks of dwellings inside the defences. During the fifteenth and sixteenth centuries the fortified castle, the château fort as it was called in France, was transformed into the commodious country mansion, the château de plaisance.

Church-building in Europe largely determined the pace and nature of change, and the different phases of Gothic during three centuries are best shown by the cathedrals and larger churches. Only prosperous cities could afford to build in competition with the Church, while kings and noblemen were so preoccupied with personal safety that outwardly their town palaces often resembled castles. Climate, local materials and the rising wardly their town palaces often resembled castles. Climate, local materials and the rising tide of nationalism affected the character of sacred and secular architecture.

Most of the French cathedrals were built during the first half of the thirteenth century. They were the hub of town life, occupying a central position, approached by processional ways which became rivers of colour during religious festivals, winding between tall houses with projecting storeys which appeared to lean towards each other across the narrow street. Unlike the English cathedrals, they did not originate as part of some monastic establishment, though there were exceptions like Soissons Cathedral, built monastic establishment, though there were exceptions like Soissons French Gothic, known between 1160 and 1212, which was the church of a Royal Abbey. French Gothic, known as Style Ogivale, has three main periods, identified by name with the form and tracery

The Gothic Achievement





The west front of Lichfield Cathedral, early fourteenth century. A complete composition including towers and spires. Copyright Walter Scott.

Chartres Cathedral, 1194-1260. There are 130 windows, adorned with thirteenth century stained glass, and the cathedral is remarkable too for the vitality of its sculpture. Reproduced by courtesy of the Architectural Association.

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of windows-a convenient though superficial identification, as each phase was also characterized by structural progress.

The first, Primaire, or Gothique à Lancettes, marked the transition from Romanesque by the introduction of pointed arches and lancet windows. The window heads were filled by geometric patterns cut through a stone plate, and from this plate tracery, bar tracery developed, with shaped members branching out from the mullions to form interlacing patterns. Secondaire, or Rayonnant, followed in the thirteenth century, literally a radiant and sparkling period, when circular windows with wheel tracery were introduced, like those in Rheims, Rouen, Amiens and Notre Dame, Paris. The last, Tertiaire, or Flamboyant, covers the fourteenth and fifteenth centuries, and denotes the wavering, flame-like character of the tracery on windows and panels.

Those periods overlapped in France as they did in the corresponding periods in England, where Gothic began with the rebuilding of Canterbury Cathedral choir in the last quarter of the twelfth century by the French master-mason, William of Sens. The three periods following the Norman are Early English, Decorated, and Perpendicular descriptive terms first used by Thomas Rickman in the early nineteenth century.







Lincoln Cathedral, rebuilt 1185–1200. The twin western towers originally had spires which became unsafe and were removed in 1807. Copyright Walter Scott.

The last period of English Gothic, the Perpendicular, appears in decorative splendour in Henry VII's Chapel at Westminster Abbey (1502–15). The roof has intricate fan vaulting. National Buildings Record. Photograph by Herbert Felton.



The medieval city of London, as it appeared before the Great Fire of 1666. From an engraving by Wenceslaus Hollar. Reproduced by courtesy of the Trustees of the British Museum.

ARCHITECTURE

Early English, also known as Lancet or First Pointed, corresponded to the French Gothique à Lancettes, and began late in the twelfth century, developing during the thirteenth, and characterized by tall lancet windows, groups of slender shafts with foliated capitals, very simple ornament, and graceful proportions. The Decorated period, sometimes called Curvilinear or Middle Pointed, followed in the fourteenth century and was richly ornamental, with elaborate window tracery and vaulting. The Crusaders had returned with far more than a few practical ideas about improved defence systems for castles: Oriental influence obviously inspired the new, sparkling intricacy of carved ornament. The final period, Perpendicular, Rectilinear or Late Pointed, is wholly English in character, lasting from the end of the fourteenth to the beginning of the sixteenth century. All foreign influences had been absorbed; three hundred years of structural experience had culminated in an architecture of line, that united strength with elegance and gave to churches, colleges, monasteries, and some of the great houses built at the end of the period, a refinement of form and a decorative quality that reflected the vigour and prosperity of late medieval civilization in England.

Gothic architecture was largely the result of building with stone. In some countries, like North Germany, Holland and Belgium, the use of brick restricted structural freedom, which altered the character of church design while stimulating progress in civic and domestic building. German Gothic was imported from France and began to replace Romanesque after the mid-thirteenth century. Medieval German churches never acquired the tense, vital look of French and English churches; no upward-sweeping lines relieved their static and structurally unambitious character, though externally they were distinguished by some fine towers and spires. A few German cathedrals, in contrast to the smaller and plainer churches, were ornamented to excess, and because the technical



The Palazzo Foscari, Venice, fifteenth century. The palaces that line the Grand Canal were designed not only with the bright sky of Venice in mind, but with the reflecting power of water taken into consideration, for the canals of Venice mirror the buildings and cast light upwards on their façades, which gives Venetian Gothic architecture a special brilliancy. Radio Times Hulton Picture Library.

ability of sculptors and wood carvers outran their discretion, every surface was smothered with extravagant decoration. In Holland the national taste for simplicity and the extensive use of bricks controlled the form and decorative character of churches and houses. The need for ornament was more than satisfied by the rich red colour and texture of brick-work

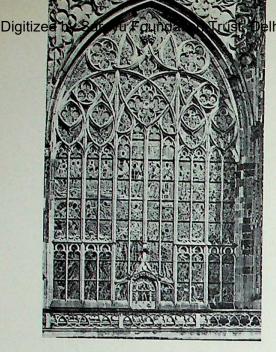
In Holland and Belgium, secular architecture tended to dominate cities. Architecturally, the city fathers and the Church were competitive. The Halles and Belfry at Bruges, the town halls of Ghent, Brussels and Louvain, and the superb Cloth Hall at Ypres—town halls of Ghent, Brussels and Louvain, and the rising power of a new and destroyed in the 1914–18 war but since rebuilt—show the rising power of a new and wealthy patron—the business community. Churches like St. Gudule at Brussels (1226—wealthy patron—the business community. Churches like St. Gudule at Brussels (1226—1280) and the cathedral at Tournai (1066–1338) were eclipsed by civic magnificence; though at Antwerp the cathedral had a dominating tower and spire, 400 feet high—an impressive example of the last period of Gothic.

In every part of Europe new ways of building changed the face of cities and the landscape. Churches, monasteries, universities and public buildings were enlarged and landscape. Each country developed a native domestic style that gave individual character beautified. Each country developed a native domestic style that gave individual character to houses of brick and stone and timber. Merchants began to build comfortable homes, to houses of brick and stone and timber. Merchants began to build comfortable homes, tree from the cramping needs of fortification; the fireplace and the hearth, or the great free from the cramping needs of fortification; the fireplace and the hearth, or the great tiled stove, became the centre and the symbol of home life in Northern Europe; windows tiled stove, became the centre and the symbol of home life in Northern Europe; windows were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged, and small panes of glass replaced oiled parchment, paper or linen. Cities were enlarged and the land parchment p

St. Mark's Square at Venice. (See page 116.)

The splendour of Gothic buildings, their variety and versatility, came as much from

The Gothic
Achievement





The great window of the south transept of the Cathedral, Prague. Like the east window of Gloucester Cathedral, this represents the victory of voids over solids: the wall has now become a lacework of stone, a frame for stained glass. From Karel Plicka's City of Baroque and Gothic.

The choir and presbytery, Gloucester Cathedral. Second quarter of the fourteenth century. The tall window floods the interior with coloured light: walls have melted away, and the whole design of a great church is moving towards the 'cage of stone', the lantern of coloured glass. National Buildings Record.

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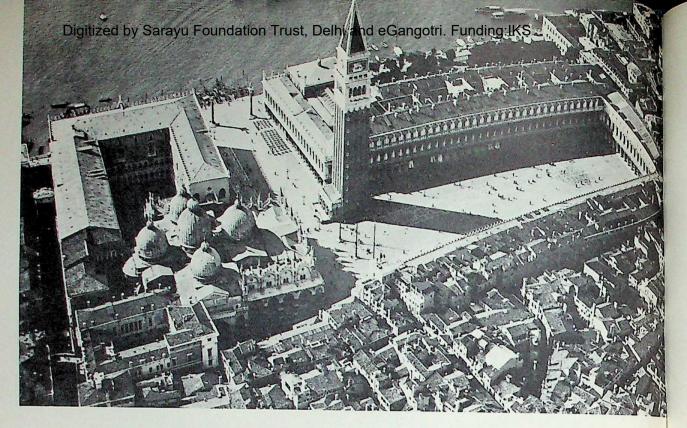
the liberation of skill as from the structural revolution. There was an international traffic in skill. Craftsmen were not tied to any particular locality. Masons and sculptors, painters, woodcarvers and artists with some special knowledge and ability might find themselves working in places as far apart as Burgos and York. Europe was a united religious community: nations might establish their separate political identity, but they were still a part of Christendom, and that spiritual unity was mirrored by Gothic architecture. From Norway to Spain the purpose and the symbolism of all Christian churches were constant. Gothic architecture in all its national variations was as unmistakably European as classic.

The Spanish churches built between the eleventh and sixteenth centuries could never be mistaken for Oriental buildings, though Saracenic influence appears in the pierced stone tracery, intricate geometrical patterns, horse-shoe arches, and the colour and gaiety of the decoration. The exotic quality of the ornament in some of the early examples suggests that Moslem craftsmen were employed. In Spain, as in Italy, hot skies and the glazed area expand progressively. The large windows of the apse of Milan cathedral central and southern Italy and in Spain was the use of arcades which gave shelter from Italian D.

Italian Romanesque had been a delicate sequel to classic architecture, and Italian Gothic was not strikingly different. The vertical tendency of Gothic was neutralized by an



The façades of the Doge's Palace at Venice display the elegant taste of an artistic business community. Oriental, Byzantine, classic and Gothic influences met and mingled at Venice. The Palace is the finest example of medieval civic architecture in the city, and the façades, with the lacelike tracery of the upper tier of arcades, date from 1309–1424. Photograph by the author.



Medieval cities, when they were commercially prosperous, acquired a civic spaciousness, though open spaces were often overshadowed by a great church. Below: The Binnenhof, at the Hague, is an open market square spread out before the west front of the Cathedral. Reproduced by permission of the German Tourist Office. Above: St. Mark's Square, at Venice, is far more spacious, and the great church is only one of the buildings that give architectural magnificence to this superb city centre. Reproduced by permission of the Italian State Tourist Office.



emphasis on horizontal lines; string courses and cornices cast bands of shadow to establish the balance between vertical and horizontal elements. The spires and high, slender vaults which proclaimed the structural revolution in France and England, are not found in Italy, though Milan Cathedral, built between 1385 and 1485, has flying buttresses and pinnacles crowned with statues. Sculpture, so closely linked with the fabric of the later French and English cathedrals, was almost an afterthought in Italy, and unrelated to the general design. Roman building was never forgotten; variations of the Corinthian capital appeared; conventional classic ornament enriched the ribs of vaults; the moulded detail of cornices recalled the pagan temple.

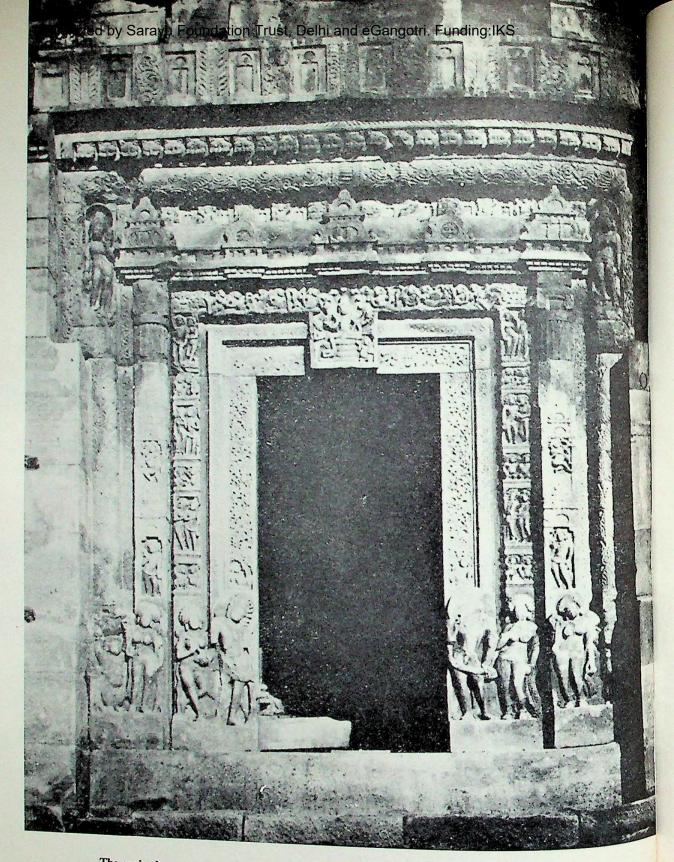
Although Italian architects modified the vertical character of Gothic, they were great tower builders. Apart from tall, graceful bell towers, like the Torre del Comune at Verona and Giotto's famous tower at Florence, there were residential towers, forerunners of the American skyscraper, sometimes built as status symbols by wealthy men whose motto was: The higher the richer. In one small town, San Gimignano near Florence, there were

as many as seventy of such towers, of which thirteen survive.

Many buildings in Venice which date from this period are entirely different from every other Italian interpretation of Gothic, just as Venice was different from every other Italian or European city. That affluent and highly civilized place attracted artists and craftsmen, patronage was generous and ambitious, and Oriental, Byzantine, classical and Gothic influences mingled. The palaces that lined the canals were fantastic, gay, elegant and luxurious. Largest and most commanding of them all is the Doge's Palace, with its arcades and columns and pointed arches and lace-like open tracery. The façades were built between 1309 and 1424, though the palace was begun in the ninth century and rebuilt several times. St. Mark's is overshadowed by the arrogant magnificence of this tall neighbour, which towers up and screens it from the lagoon, so that only the crosses above the five domes are visible over the palace roof. (See page 73 and opposite.) Venetian Gothic, like the civic, social and commercial structure of the Venetian republic, was unique, but was nevertheless part of the Gothic achievement.

The story of architecture in the West was changed by the Gothic revolution, which released skill, identified art with life, not only through buildings—the Greeks had done that—but through the shape and colour of everything made and used by men. Art in the Roman Empire and in many Oriental civilizations had been an exclusive luxury. In the Christian states of medieval Europe there was great architecture and a vivid popular art, shared and enjoyed by all.

The Gothic Achievement



The main doorway of the temple of Vishnu, at Deogarh, a finely proportioned example of Hindu architecture, dating from the fifth century A.D. The moulded detail and the projecting cornice are designed for the powerful sunlight of India. Reproduced from The Art and Architecture of India, by Benjamin Rowland. Pelican History of Art.

CHAPTER FOURTEEN

Growth and Spread of Indian Architecture

As early perhaps as 3500 B.C., the urban people of the Indus Valley built well-planned cities with broad, regular streets. Excavations at Mohenjodaro, in Pakistan, and at Harappa, have revealed the remains of well-built, commodious houses, with internal stairways, bathrooms, cellars, store-rooms and underground drainage. Mohenjodaro lies on the Indus, some 265 miles upstream from Karachi; Harappa about 116 miles south-west of Lahore. What happened to that ancient civilization is unknown. When the nomadic Aryans came south from Central Asia about 1500 B.C., only primitive tribes, without arts or crafts, lived in the Valley. Apart from those ruins nothing is known of prehistoric India. The Aryans, a poetic and religious people, built no monuments of brick or stone, but left their speech which became the great ancestor of nearly all European languages.

Indian architecture may be traced back to the Buddhist monasteries of the fifth century B.C., but much of the early work has perished; impermanent materials were used, and forms evolved in timber were not transferred to stone until the third century B.C. and forms evolved in timber were not transferred to stone until the third century B.C. The Buddhist is the first of the three main styles of Indian architecture, and lasted from about 250 to 200 B.C. to the middle of the eighth century A.D. Only the rock-cut temples of this period survive. The sanctuary at Karli was described in Chapter 9, where the of this period survive. The sanctuary at Karli was described in Chapter 9, where the of this period survive. The Buddhist Temples, or Chaityas, Chaitya-hall recalls the work of the medieval builders. The Buddhist Temples, or Chaityas, had one external façade, but inside their resemblance to the cathedrals of Christian had one external façade, for they anticipated the arrangement of three aisles formed by two two columns found in Early Christian churches, and also reproduced some of the characteristics of the Roman basilica.

The impressiveness of the temple at Karli is matched by that at Elephanta, also cut from the rock, supported within by massive columns, rising from a prolonged square-sectioned base with curved faces for about two-thirds of their height, with the upper third sectioned base with curved faces for about two-thirds of their height, with the upper third



The Sūrya Deul temple, the so-called Black Pagoda, at Kanarak, built in the thirteenth century A.D. A firm, symmetrical arrangement of masses, united by emphatic horizontal lines.

ARCHITECTURE

rounded and fluted and terminating in a broad fluted capital, like a squat version of Roman Doric. Although these excavated works reproduce structural forms, they disclose no structural inventiveness.

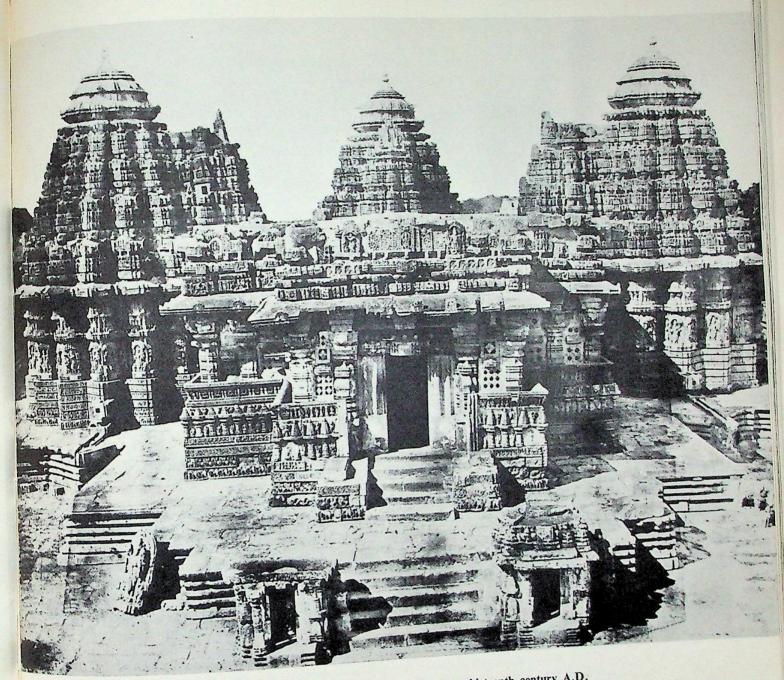
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The stupas or relic mounds, which also date from this period, were artificial hills of earth faced with brickwork, built with the mathematical precision of an Egyptian pyramid, and giving an impression of timeless, inert repose. Their design perfectly expressed their function as guard houses for sacred relics.

Apart from temples, stupas and monasteries, an immense amount of Indian architecture of this period (and later periods too) has vanished. The reason for this was not only that perishable materials were used. Many Indian cities were mere appendages to some Prince's extravagant palace, which was the sole reason for their existence. There was no permanence in these petty principalities and their servile cities; they were quite unlike Minoan cities where the palace was the social centre; many unconsciously repeated on a smaller scale and a different plan, Mansur's Baghdad. They disappeared, as a result of palace revolutions, wars or invasions, and India is full of ruined and deserted cities, some swallowed up by the jungle.

The columns and capitals used in the Buddhist style corresponded to an order of architecture. Lions, elephants, horses and human figures decorated the capitals of those round and octagonal columns, without consistency of choice in the subjects but gratifying an irrepressible taste for variety. The commemorative columns, called Stambhas or Lats, also supported an emblem in the form of an animal.

Saracenic architecture had moved east and west from Asia Minor: Indian architecture moved east. Buddhist art with its symbolism was expressed in the buildings of Nepal and Tibet in the north, Ceylon in the south, and those of Burma in the east. The Jaina style



The Kesava temple at Somnāthpur, built in the second half of the thirteenth century A.D. Here a web of sculptured detail softens vertical and horizontal lines. Reproduced from The Art and Architecture of India, by Benjamin Rowland. Pelican History of Art.

lasted from approximately A.D. 1000 to the fourteenth century, and the Hindu or Brahmin style originated earlier, about A.D. 600, and has continued to the twentieth century. These periods overlapped, and the mingled influences of Buddhism and Brahminism produced innumerable temples, monasteries and palaces.

The Jaina style affected the whole of India, and all over that vast land the pointed domes of its monuments, temples and towers of victory, stand out against a burning sky. Those pointed domes were formed by horizontal rings, wholly different from the circular domes of the west or the bulbous domes of many Moslem buildings. Jain temples are often cruciform in plan and above them rises a tall, pyramidal, storeyed tower, with the sides curved, and every surface diversified by sculpture. The encrustation of surfaces with running ornament and sculpture, instead of detracting from the effect of mass, enhances the bulk of a building, for the intense light of India gives a three-dimensional solidity by the repetition and interplay of small shadow patterns, an effect that the far less emphatic moulded detail used in the West for surface variation could never achieve in such conditions.

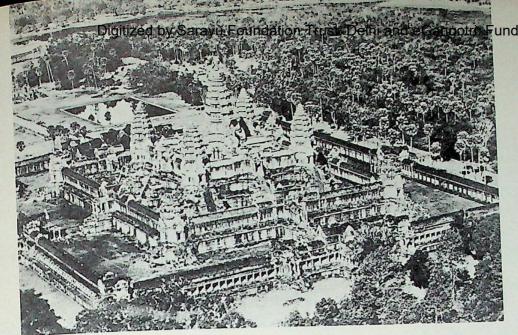
The Hindu style is varied in character by three regional divisions: the Northern, originating and developing in North India from the seventh century to the present, the Chalukyan, lasting from the eleventh to the fourteenth century, and the Dravidian, which grew to maturity in South India, from the mid-fourteenth to the mid-eighteenth century. The Brahmin temples have one feature in common, the small shrine-cell and entrance porch, known as the *vimana*; and all three variations of the style have flowing bands of sculpture, while vertical shadow-lines give to a static mass that air of striving mobility which the Gothic builders achieved by sheer structural daring. The Hindu architects imposed that air of movement by towering pyramidal roofs, curved in the Northern style and stepped in the Dravidian, with a straight-sided cone in the Chalukyan; so tall, emphatic shadows led the eye upwards, instead of letting it flit from side to side in pursuit of the lateral features. Despite the overwhelming amount of sculptured detail, the general effect is one of coherence, unity and stability.

One of the outstanding exceptions is the famous Black Pagoda at Kanarak, thirteenth century A.D., with a roof that appears to be a succession of receding horizontal structural lines, rising from the cornice to the circular, button-like cupola. A classical firmness of composition is achieved by the symmetrical arrangement of the masses, and some attempt has been made to relieve the static character of this temple by using as symbols of mobility, representations of the wheels of juggernaut cars in the carved decoration of the base, which also draws attention to the fact that the whole building resembles the shape of a juggernaut car. It is not a true pagoda though it may have been a prototype for some later developments in Burma and China.

The siting of temples was related to the landscape. Natural features were associated with both temples and palaces. Lakes and ponds were placed so that reflections could play their part in the grand composition.

The characteristic forms of Hindu architecture spread eastwards beyond Burma, to Siam, Cambodia, Sumatra and Java. In Cambodia the Khmer civilization had risen and between the ninth and the fifteenth centuries attained a mastery of architecture that

ARCHITECTURE



The Angkor Vat, in Cambodia, built during the first half of the twelfth century A.D., and the architectural triumph of the Khmer civilisation. Reproduced by courtesy of the Mansell Collection.

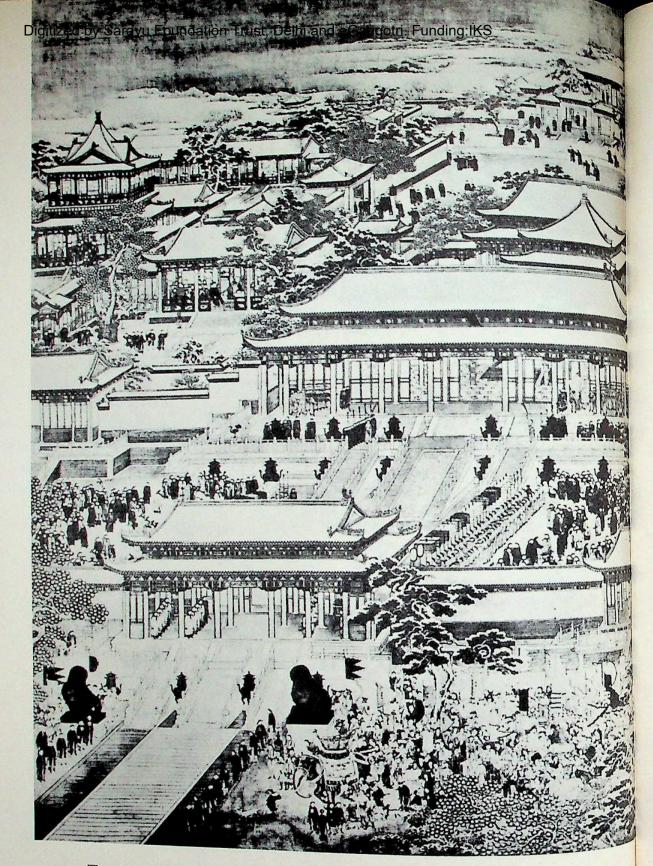
culminated in one of the great buildings of the world: the Angkor Vat. After the collapse of that civilization, following a disastrous war with Siam, the prosperity of the country foundered: art, luxury and religion went down with the wreck, and this enormous group of buildings was engulfed by the jungle, dimly remembered as a legendary marvel, until rediscovered by Europeans five hundred years later. Built during the first half of the twelfth century, the Angkor Vat is cruciform in plan, with a central pyramidal mass from which five conical towers soar up like spires, one at each corner with the highest in the centre, all gently reflected by surrounding sheets of water. Every surface shows the intimate partnership of sculptor and architect; the eye is held by the vitality and movement of the carved figures which portray every aspect of life, religious belief, love and pleasure—all the concerns, ideas and gods of a once-powerful people. This outer covering of lively sculpture is held together and related to the composition by a lace-like form of decoration, so at a distance the vast monument acquires a rich surface texture, which only becomes distractingly articulate at close quarters.

The whole architectural conception of Angkor is perhaps the greatest triumph of Oriental genius, as different from the Taj Mahal as the Parthenon is different from Santa Sophia or Chartres and as unforgettable.

Sophia or Chartres and as unforgettable.

What the classic architecture of Greece and Rome did for the Western world, Buddhist and Hindu architecture did for south-east Asia; and, as we saw in Chapter 11, India provided the most fertile and inspiring environment when Moslem architecture came with the Moguls.

Growth and Spread of Indian Architecture



The relationship of the buildings in this group is established by the dominant horizontal lines of the roofs. This painting, by an anonymous eighteenth-century artist, shows a grand audience at the Imperial Palace, Peking. From the Palace Museum, Peking. Reproduced in The Art and Architecture of China, by Laurence Sickman and Alexander Soper. Pelican History of

CHAPTER FIFTEEN

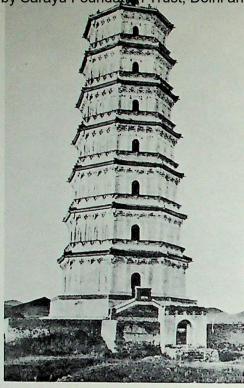
China and Japan

The architecture of China, like that of ancient Egypt, faithfully records the static quality of a civilization that was established and secure, where poets and scholars, artists and philosophers expressed the genius of their country, and natural beauty was regarded so highly that large-scale creative works in the form of gardens and the design of whole landscapes had a superior importance. To the Chinese landscape architect a building was incidental: a decorative punctuation mark, so to speak, in a grand composition of trees and banks of flowering shrubs and lakes with artificial islands, linked together by small ornamental bridges—a willow-pattern plate scene with innumerable refinements, repeated with subtle variations, resting and satisfying and never wearying the eye. Palaces and country houses were open pavilions, with terraces and verandas, and apart from the innermost chambers, every room had a view. Life in China, like life in the city states of ancient Greece, was lit by an almost universal love and understanding of art.

This preoccupation with garden design did not retard the development of a distinctive and beautiful architectural style, but after creating that style architects seemed content to continue it for centuries, just as those fairy-tale variations of landscape gardening were continued. Repetition in Chinese architecture, however, was never boring or oppressive as in Egypt: light, gay and decorative forms were evolved and carried out in timber and brick without concern for permanence—apart from the Great Wall. That colossal military work, begun in the third century B.C., encircled the northern provinces, while a shorter wall, built about 100 B.C., guarded the road from Peking to Khotan and Kashgar. The Wall was repaired in the fifteenth century A.D., extended by 300 miles in the sixteenth, and the total length, including all the windings, was 1,500 miles. Behind that shield a wise and graceful civilization was able to resist change, generation after generation.

Of the earlier building accomplishments of the Chinese, no trace remains, as wood

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The White Pagoda of Pai-t'ai-ssu, at Ch'ing-chou. Eleventh or early twelfth century A.D. From The Art and Architecture of China, by Laurence Sickman and Alexander Soper. Pelican History of Art.

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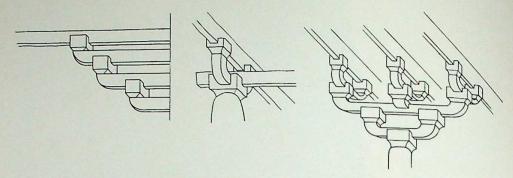
was the principal material used. The chief characteristic of their architecture is the form of the roof, originally derived from the use of bamboo for constructional purposes and completely dominating the design of nearly every type of building. The roof remained as the outstanding feature, unrelated to the walls, which were mere screens, upheld by timber supports, and extended on timber brackets and lever arms, which, as mentioned in Chapter 1, represented an elementary use of the cantilever principle. Double and triple roofs, curving up gently at the angles, gave additional height, while preserving the streaming horizontal lines. These tiers of roofs, when used on towers, may have originated that most outstanding architectural form—the pagoda.

The word pagoda was introduced in the sixteenth century by Portuguese traders in India; they spelt it pagode, the nearest they could get to some native word, for in the East the term was used for a temple. In architecture it has become accepted as the description of the many-sided, multi-storeyed towers of China, Japan and Burma. Such towers were originally sacred in China but later examples were secular, and often commemorative monuments. The pagoda has become as symbolic of Chinese architecture as the minaret of Moslem or the spire of Gothic.

Temples with successive and diminishing tiers of roofs were built in India as early as the ninth century A.D., like the Black Pagoda at Kanarak, described in the previous chapter; but those were different in conception and form from the superb towers designed by Chinese architects, rising to several storeys, or the lighter and more varied Japanese types with their storeys shaded by broad projecting roofs, turned up at the corners. Two famous Chinese examples, dating from the eleventh or early twelfth century, are the White Pagoda of Pai-t'-ssu at Ch'ing-chou, with seven storeys, and the Pagoda of T'ien-ning-ssu, at Peking. A much earlier pagoda, that of Sung-yüeh-ssu on Mount Sung in Honan, built



Pagoda of T'ien-ning-ssu, Peking. Eleventh or early twelfth century. From The Art and Architecture of China by Laurence Sickman and Alexander Soper. Pelican History of Art.

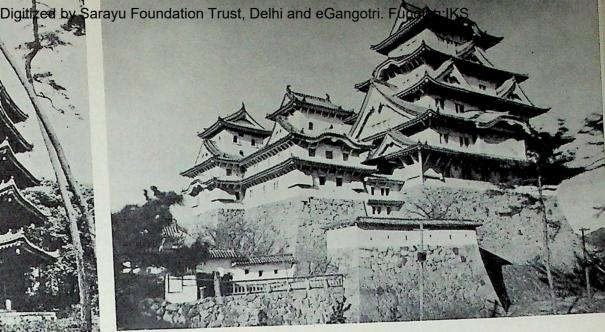


Left: Series of bracket supports for roof beams, branching from capital of wooden column. Centre: Capital of column with supporting beam socketed into it, and brackets branching out to support entablature. Right: Projecting brackets supporting a beam. (Compare this method of support with hammer-beam medieval roof on page 105.)



The East Pagoda, Yakushiji. Japanese, eighth century A.D. From The Art and Architecture of Japan, by Robert Treat Paine and Alexander Soper. Pelican History of Art.





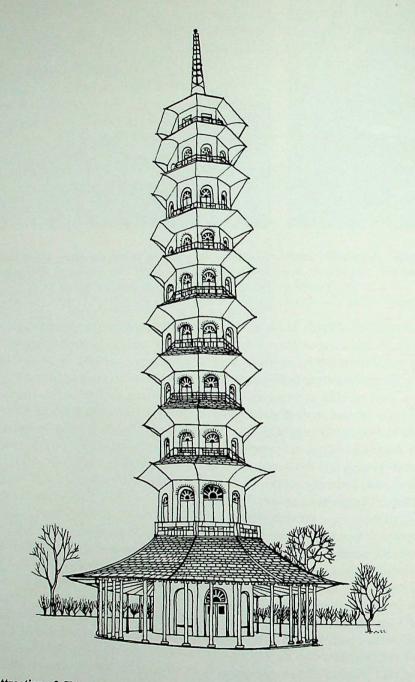
Pagoda of Daigoji. Japanese, tenth century A.D. From The Art and Architecture of China, by Laurence Sickman and Alexander Soper. Pelican History of Art.

Himeji Castle, where the decorative gaiety of the roof lines asserts the triumph of art over the needs of fortification. From The Art and Architecture of Japan, by Robert Treat Paine and Alexander Soper. Pelican History of Art.

in the sixth century of brick, had twelve faces, and fifteen projecting eaves, rising above the high plinth, diminishing as they ascended in a curve comparable in delicacy with the entasis of a Greek column. All these were of permanent materials. Although excellent masonry distinguishes many buildings, it was in timber construction that Chinese architects attained a level of skill approached only by the medieval carpenters and joiners who made the great beamed roofs of guild halls and cathedrals in Europe. Such light materials as bamboo had obviously suggested many forms, and with stronger and heavier woods the structural possibilities must have seemed as revolutionary as those following the introduction of steel-framing and ferro-concrete in the late nineteenth century. No weight, apart from a tiled roof, had to be supported. Buildings expanded laterally instead of vertically: the Confucian Temple of Heaven at Peking had a triple roof with bright blue glazed tiles. Generally, pagodas were the only really tall buildings. Some other buildings might have two or perhaps three storeys, marked by those expansive projecting roofs which shaded verandas on the upper floors, but the long, low, open pavilion type of structure prevailed.

Characteristically, Chinese builders evolved a technique of timber construction which amplified traditional forms and gave them a new and larger life. They discovered the cantilever principle through their use of interlocked wooden brackets and lever arms, which held up the umbrella-like roofs of their long buildings; some had a lower and an upper roof, with a narrow band of openings between to light the ceiling inside: a dwarfed upper roof, with a narrow band of openings between to light the ceiling inside: a dwarfed version of the clerestory in a Romanesque or Gothic church. Brackets rested on smooth version of the clerestory in a Romanesque or Gothic church. Brackets rested on smooth cylindrical columns, like branching capitals, or on beams supported by columns, and rose, a succession of corbels, interlocking at right angles with other rising brackets, to form a staunch framework. Beams were carried by the uppermost bracket, bridging as large a staunch framework. Beams were carried by the uppermost bracket, bridging strain of gap as the strength of the timber allowed. That was the limitation: the breaking strain of

China and Japan



The attraction of Chinese forms inspired many European architects to create such decorative trifles as the pagoda at Kew Gardens, Surrey, designed by Sir William Chambers and built 1757-62. Drawn by David Owen.

an individual beam after the width of the space to be spanned had been reduced as far as possible by successive projections of the supporting brackets.

These stepped brackets resembled the stepped corbels used by the Mycenæan builders —described in Chapters 1 and 5—when they wanted to span an opening with a triangular arch above a lintel or cover a circular area with a dome. The Chinese joiners never allowed their stepped brackets to ascend high enough to form a triangular arch of irregular outline: they stopped after five or six steps, and rested a horizontal beam on the top bracket. This technique led to the calculated balancing of weights and thrusts, which removed any suggestion of conflict between horizontal and vertical members; the graceful shape of the supporting brackets was accentuated by carved and painted ornamentation. Temples, palaces and towers acquired an air of elegant stability.

Externally, those buildings appeared to be of post-and-lintel construction. The smooth columns, which sometimes tapered slightly towards the top with a capital splayed outwards or crowned by a shallow abacus on which the bracket rested, supported the equivalent of a classic entablature. Behind that the brackets rose inwards, projecting one above the other to perform their structural task of supporting the roof, while the eaves shadowed the entablature in front, and presented a serrated line of ornamental tiling. The real secret of the construction was concealed by the long flowing roofs that seemed to float above the slender uprights. Every detail of decoration, every vertical and horizontal member, was regulated by a masterly system of proportions, which allowed infinite variation.

The painting by an anonymous eighteenth-century artist of a grand audience at the Imperial Palace, reproduced on page 124, shows the placid and pleasant relationship of a group of buildings, all individually different but shaped by a common approach to design, and a mature technique of construction. Individual houses, like temples and palaces, were generally of one storey, with a steep pitched roof, overhanging eaves, and grotesque carved ornament decorating the upturned angles. The pavilions were surrounded by gardens, designed to suggest a natural landscape; even the larger town houses consisted of detached pavilions, standing in a great garden, with a porter's lodge on the street, giving admission to the grounds.

Japanese builders used the same form of timber construction. Though largely derived from China—the style was apparently introduced by Buddhist missionaries in the sixth century A.D.—the architecture of Japan has distinctive characteristics: the gifted Japanese artists and craftsmen gave to everything they built a refinement of line and an easy grace of form. A Chinese pagoda, for example, is a multi-storeyed tower, with the storeys lightly shaded by projecting roofs, which are sometimes little more than heavy cornices, as on the White Pagoda. The Japanese counterpart is a far more open structure with roofs spreading like wings and the core of the tower partly drowned in shadow. Square in plan and seldom having more than five storeys, the roofs are poised, as if in upward flight, and on some pagodas diminishing in area as they ascend; on others all five roofs are identical, while the uppermost is crowned by a tall decorative finial like a slender spire. In common with most Japanese structures they are built of timber to resist earthquake shocks. The number of roofs does not always correspond with the storeys, as exemplified by the East Pagoda, Yakushiji, which may date from the eighth century A.D., or earlier still. This has a boldness

China and Fapan



The courtyard nucleus of the temple of Hōryūji, Japan, dating from the seventh century. This view from the south-west shows the same horizontal relationship of roof lines that appears in the Chinese example on page 124. From The Art and Architecture of Japan, by Robert Treat Paine and Alexander Soper. Pelican History of Art.

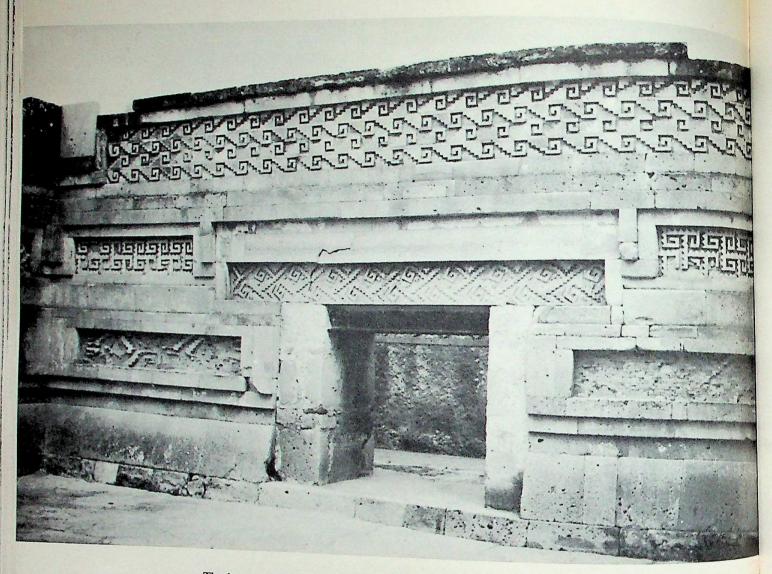
and vigour of design, achieved at the expense of the airy elegance that characterizes pagodas where the successive roofs are the same size: here they vary, and the storeys seem to be piled rather clumsily one upon the other. Such deliberate irregularity is exceptional: the five-storeyed example on page 128 has a bold clarity of form without any loss of elegance, and the tenth-century pagoda of Daigoji has the light-hearted decorative flourishes that distinguish nearly all Japanese roof forms, and persist with undiminished liveliness through the whole history of Japanese architecture. This lively interplay of curves and angles appears in the eaves and gables of the late sixteenth-century Himeji castle on page 129. Such fortified buildings show the influence of European technicians, for the weapons and defensive devices of Western civilization had reached Japan.

China and Japan

Pagodas, palaces, temples and castles had an air of permanence—though permanent Japan. materials were only used extensively in castles—but the timber-built one-storeyed houses were by Western standards, almost flimsy, despite their strong timber frames. External walls are covered with weather-boarding, and sliding paper screens are used for internal partitions, so rooms may be enlarged, or the whole house converted without trouble into one large hall. All the decorative work, the carved details of timber framing, brackets and gable ends, illustrate the Japanese gift for using intricate motifs, on any scale, but particularly in miniature. Carved ornament and flat surfaces are enlivened with vivid colour and gilding. There is gaiety without garishness, and in such structures as the small, exquisite houses built specially for the ceremony of tea-drinking, the architecture of Japan attains a delicacy of form and decoration unequalled in the East or West. In palaces and private houses alike, there are always specially designed recesses for flowers and pictures, so interior decoration is constantly refreshed, never becoming stale or static, for the pictures are changed frequently, and the owner's collection kept in a fire-proof store, while the movable paper walls, sliding below a frieze of wood or plaster, are plain.

The arts of China and Japan gradually became known to the West from the sixteenth century onwards, and affected architectural taste in many European countries on and off

for three hundred years.



The interior court of the temple at Mitla, decorated with geometrical patterns. From The Story of Architecture in Mexico, by Trent Elwood Sanford.

CHAPTER SIXTEEN

American Architecture before Columbus

The civilizations of America that were established before the discoveries of Columbus included the Maya in Honduras and Yucatan, the Inca in Peru, and the Toltec and Aztec in Mexico. In each a characteristic architecture evolved, though nothing of importance was contributed by these isolated civilizations to building knowledge or technique. Even before the Spanish conquistadors came, their development had been arrested, and the Mayan civilization had been abandoned in what is now Honduras, and transplanted to the peninsula of Yucatan.

Little is known of Mayan history, but because the Mayas were astronomers and had a calendar, some archæologists date the beginning of their civilization as early as the sixth century B.C., and their well-planned cities and temples and palaces about the first century A.D. Their large buildings were mainly religious; the city surrounded a big square, with a terraced mound or platform occupying one side on which a group of temples stood, each rising from a pyramidal base, with monasteries, nunneries and astronomical observatories, all of stone and coated with brilliantly coloured stucco. Mayan builders had solved some elementary structural problems. They used a triangular arch, formed either from two stone slabs inclined inwards and meeting clumsily without a proper joint or keystone, or built up from courses of masonry, like a variation of the Mycenæan corbelled arch. Such arches played no structural part, though rudimentary vaulted masonry roofs sometimes covered small chambers. Post-and-lintel construction gave those squat, massive Mayan buildings their heavily-marked horizontal lines. Figures of men and animals were carved as surface decoration on the earlier work; the human faces, invariably malformed, suggested a sinister interest in grotesque distortion. Such carvings were succeeded on later buildings by intricate geometric forms. Colours were used to emphasize features of the design. All periods of Mayan architecture showed a barbaric love of profusion and an inability to leave any space plain.

The Incas of Peru were accomplished builders, and their masonry consisted of large blocks of stone, accurately shaped and fitted together without mortar. Some of their structural devices resembled those used by the Mycenæan builders, notably the inward sloping of door openings to reduce the width of the lintel. They built stone temples, round or rectangular, standing on stepped, stone-built mounds or platforms. Their engineering was impressive, and the country had excellent roads, with post-houses at intervals, which ran for hundreds of miles, over mountain ranges and deserts. The Inca Empire had existed for about five centuries before being overwhelmed by a small number of well-armed Spanish adventurers, led by Francisco Pizarro, who landed in Peru in 1531 and by 1538 had conquered the country.

The highly organized but barbaric Aztec civilization, that existed in what is now Mexico before the Spanish conquest in 1520 by Hernando Cortés, was a military state with a king, an aristocracy and a powerful priesthood, which conducted the most repellently bloodthirsty religion in history. Human sacrifices followed by cannibalism were ceremonial practices, and temples were designed to give them the utmost publicity. Those buildings were not unlike the Sumerian and Babylonian ziggurats, for they stood at the top of a

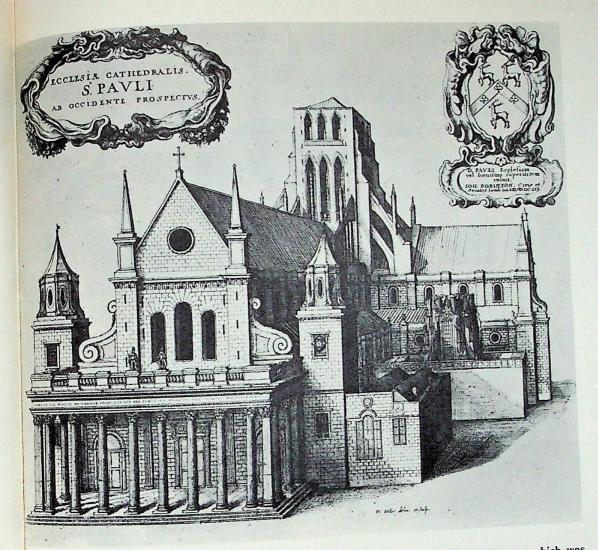
terraced or stepped pyramid and were approached by central stairways.

At the Aztec capital of Tenochtitlán, a group of sacred and royal buildings included the great temple, crowning a vast terraced pyramid, flanked by the single-storeyed royal palaces of Axayacatl and Montezuma, with a circular temple dedicated to Quetzalcoatl, the God of the Winds, and a sinister structure for displaying the skulls of the sacrificed victims—the *tzomoantli* or skull rack. The pyramids were built with a core of rubble and adobe—sun-dried mud brick—and were faced with stone, plastered over with brightly coloured stucco. The pitched roofs of the temples were of adobe or thatch, supported by wooden beams.

The architecture of the Toltecs and the Aztecs was dedicated to religion. Apart from royal palaces, everything of large size was built for the glory of their monstrous gods. The palaces covered vast areas, with hundreds of rooms built round courts or open squares, and gardens with terraces, ornamental pools and waterfalls. The priests and nobles lived in smaller palaces, usually built of a porous material consisting of silica and volcanic ash, rather like pale red pumice stone. The rooms opened on to a central courtyard where a fountain played and flowers blossomed, and the long flat roofs carried flower gardens. This intermingling of buildings and gardens on different levels gave a spacious character to their cities. Even the one-storeyed houses of the middle classes had a central court, and were built of adobe on a raised stone-faced platform. Farmers and peasants lived in small houses of wattle-and-daub or adobe, with thatched roofs.

Surfaces were decorated with symbolic sculpture—involved, terrifying and grotesque, or else purely geometrical, like the patterns on the inner court of the temple at Mitla shown on page 134. Although the Spaniards deliberately destroyed the monuments of Aztec civilization and religion, some of the exotic quality of Aztec ornament was mingled with late Spanish Gothic and the classic forms of the Renaissance when the conquerors began to build churches and monasteries in their American colonies. Inca architecture contributed nothing to Spanish-American design.

ARCHITECTURE



The next three chapters reveal the rise and spread of Renaissance architecture, which was based on a revival of the classic orders used in the Graeco-Roman world. This revival at first led to conflict with existing Gothic forms, then to compromise and patchwork of the kind shown here in the engraving of Old St. Paul's, London. A classical porch had been added to the west front by Inigo Jones, and various other classic additions, but they were obvious and alien additions to the Gothic fabric. All were destroyed in the Great Fire of 1666, and a classic cathedral by Sir Christopher Wren replaced the old church. (See page 153.) From an classic cathedral by Sir Christopher Wren replaced the old church. (See page 153.) From an engraving by Hollar in Sir William Dugdale's History of St. Paul's Cathedral, 1658. Reproduced by courtesy of the Trustees of the British Museum.



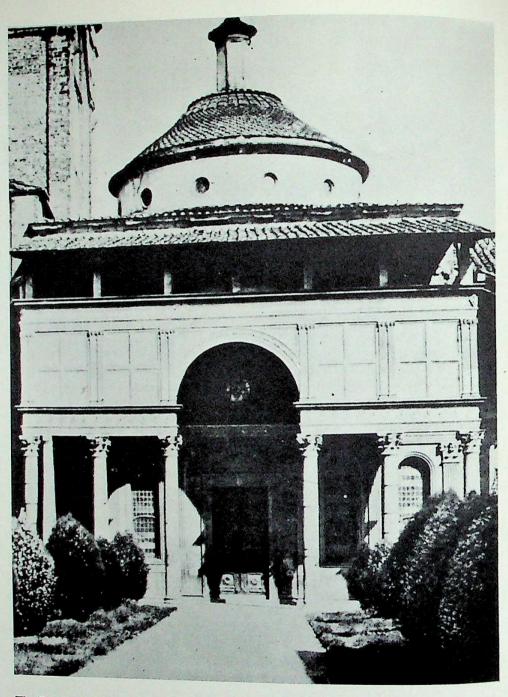
The Tempietto in S. Pietro in Montorio, Rome, 1502-10. Designed by Bramante. This building shows the new relationship between drum and dome, which was characteristic of Renaissance architecture. Reproduced by courtesy of the Mansell Collection.

CHAPTER SEVENTEEN

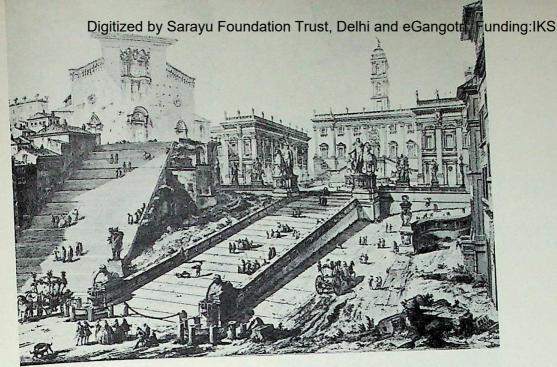
The Early Renaissance in Europe

The Renaissance began in Florence early in the fifteenth century as a rebirth of ancient learning. This revival of Graeco-Roman arts and sciences restored the classic orders, ended the Gothic adventure and, later, led to the partial domination of architecture by fashion, thus making an abrupt break in the evolution of design and opening a gulf between art and everyday life. The native domestic styles which had developed in many countries were lost, and the return to Vitruvian rules introduced a transitional period of imitation and compromise, but eventually a new mastery of architectural composition throughout Europe culminated in the great century, the eighteenth, which was the golden age of design.

A thousand years separated the early Renaissance architects from their Roman predecessors; they had far more knowledge about structure and the use of materials than Vitruvius ever recorded or imagined. When his works, hitherto preserved in manuscript, were first printed towards the end of the fifteenth century, they were used as guides to the proper proportions of the five orders—Doric, Ionic, Corinthian, Tuscan and Composite but there his authority ended. The post-and-lintel architecture of the Roman Empire had been outgrown, and the men of genius who reinstated classic architecture in Florence, Rome and Venice, used the orders with a super-Roman freedom and inventiveness, and recognized in them a universal system of design which gave the architect professional status as a master-designer—a position that he kept for over three centuries. Civil and military engineering had been the architect's responsibility in Roman times and the Middle Ages: they were still. In the early Renaissance men like Leonardo da Vinci (1452-1519) were not only architects and engineers but painters and sculptors as well. Michelangelo (1475-1564) was a sculptor, painter and architect. Men who combined such gifts and skills created buildings that were like pictures in three dimensions, assembling form and colour in a great later than the second secon in a grand design.



The Pazzi Chapel, Florence, 1420. Designed by Filippo Brunelleschi. Reproduced by courtesy of the Mansell Collection.



The Capitol at Rome, Michelangelo's great conception of civic design, laid out and built amid the ruins of the ancient city. From an engraving by Piranesi.

Italy became the light of Europe, not only in art and architecture but in thought: the medieval preoccupation with religion and the world to come was replaced by humanism, which was concerned with human rather than divine interests. Tentative attempts to revive the pagan cults were nipped in the bud by the Church, but from the intellectual and cultural ferment of the Renaissance the scientific spirit arose, disturbingly inquisitive and beyond ecclesiastical control. Modern times were beginning.

Structural experiment ceased to be the mainspring of architectural character when buildings were designed by men whose genius had been proved by their personal creative work as painters and sculptors. They were not copying Roman work: they were giving the fire of new life to the classic orders. Roman and Byzantine models could not satisfy the needs of an affluent and sophisticated society. Vitruvius had no practical value when palaces had to be designed with enclosing walls and several floors, rows of windows and elaborate staircases, like the Palazzo Strozzi at Florence or the Palazzo Farnese at Roman

Familiar forms were changed, including the dome, which was no longer a shallow curved lid closing the top of a cylinder, or externally insignificant like the dome of the Pantheon or Santa Sophia. The Renaissance dome rose from a high supporting drum like a miniature tower, a majestic hemisphere crowned by a lantern. An early, small-scale example of this new relationship of drum and dome is Bramante's Tempietto of St. Pietro example of this new relationship of drum and dome is Bramante's Tempietto of St. Pietro example of this new relationship of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, based on the design of a small classic temple, but far more imaginative in Montorio, Rome, and Longo and

The Early Renaissance in Europe



Interior of S. Lorenzo, Florence, designed by Filippo Brunelleschi and built in 1425. Compare this interior with that of St. Paul'soutside-the-Walls on page 62, where the classic orders are used without much imagination and according to long-established convention. In S. Lorenzo a fresh and vivid understanding of classic architecture is apparent—crisp, imaginative and lucid. This crispness of line and lucidity of form was overtaken by the extravagance of the baroque, as the interior of St. Ignatius' Church at Prague on page 146 shows, when structural lines and noble proportions were blurred by decoration that had got out of hand. Photograph by Richard C. Grierson.

ARCHITECTURE

After the fifteenth century, the medieval towers and spires of nearly every European city were rivalled by the swelling shapes of domes and cupolas. The skyline was changing; so was the character of the street. The Gothic façades of town houses, richly and splendidly ornamental, had possessed fantastic diversity, for each site was developed as an individual unit, and the result was highly decorative chaos, both at street level and in the picturesque variety of roofs and chimneys. Renaissance architects discovered the possibilities of the street; the orderly impressiveness of continuous horizontal lines was revealed when buildings were designed as related instead of independent units, and new dignity was given to open spaces by such improvements in town-planning as the Capitol at Rome—Michelangelo's noble civic design.

Renaissance architecture in Italy and in other European countries passed through periods of adventure and discovery, of austere and dull loyalty to the letter of Vitruvian rules, and to extravagant rebellions against those rules, which led to the lavish magnificence of the baroque and the elegant complexity of the rococo styles, which developed during the seventeenth and eighteenth centuries. After such indulgence, the leaders of taste and fashion—cultivated noblemen and scholarly architects—would decree that design must be refreshed by a return to the purity of the classic orders. The pursuit of such purity led to a revival of the three Greek orders at the end of the eighteenth century, and this Greek revival was the last phase of the Renaissance.

CHAPTER EIGHTEEN

Growth and Spread of Renaissance Architecture

The standardized architecture of Rome had prevented local variations of the classic orders developing in any part of the Empire, but after the Renaissance the European states produced their own national versions of classic, as distinctive as their rendering of Romanesque and Gothic. To begin with, this revived classic architecture was thought of as an Italian fashion, and as rich and cultivated noblemen admired Italian taste and art, the right thing to do was to import this fashion and impose it on domestic buildings. This led to conflict in the early sixteenth century, for when a system of design was mistaken for a decorative fashion, the ornamental features monopolized attention at the expense of a proper understanding of classic proportions.

In France, the conflict was between the master-masons who built in the traditional manner, and the scholarly architects who had studied in Italy, and were employed by an aristocratic or royal patron who wanted something modish with Italian trimmings. A great building like the Château de Chambord (1526) was a compromise between conflicting elements. The general mass has something of the medieval castle about it, the conical roofs, angle towers and cluster of vertical features are Gothic in character, Renaissance detail is dabbed over the façade, and the whole composition is tied together by horizontal lines beneath the windows. The design may have partly followed the small scale model made by the Italian architect, Domenico da Cortona, but the work seems to be largely that of the French master-mason, who was almost certainly responsible for the famous double spiral staircase inside, which was a development of the medieval newel staircase, winding upwards around a central newel post. A smaller and simpler example, dating from the mid-fourteenth century, ascends in the south-west turret of the Collegiate Church of Tamworth in Staffordshire.

Nearly all the early Renaissance works in France were chateaux for the nobility, and

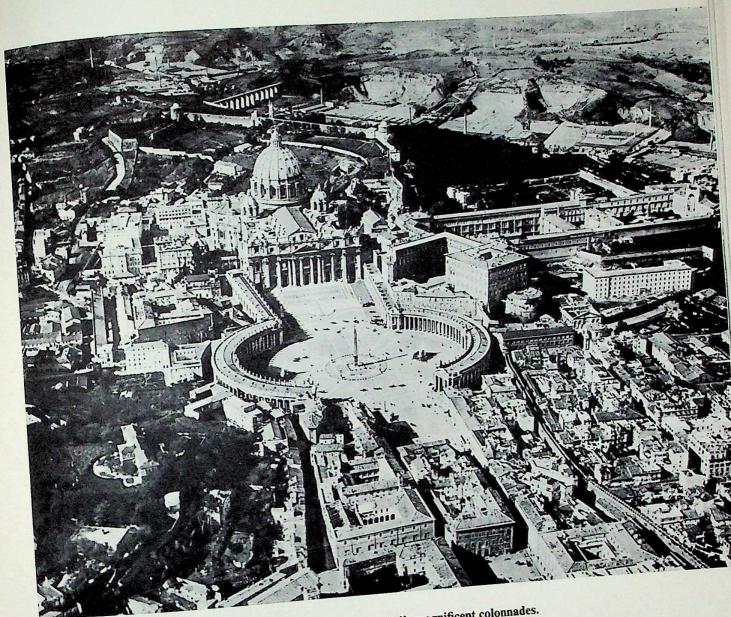


The Château de Chambord, built 1525-44. The design reveals the conflict between medieval tradition, championed by French master masons, and the ideas introduced from Italy by the new, fashionable architects. (Another example of this conflict is given on page 137.) By permission of the French Tourist Office.

ARCHITECTURE

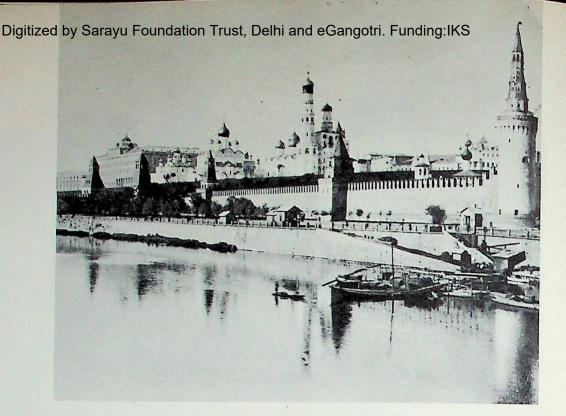
until the middle of the sixteenth century the resistance to Italian ideas was powerful among a people whose social outlook was medieval, and whose craftsmen, building in the late Gothic style, continued to use the steep roofs and dormer windows of the Middle Ages, long after the significance of the classic orders had been grasped. By the beginning of the seventeenth century French architects had created a domestic style of brick and stone, with bold, firm lines, regulated by classic proportions. Extensive town-planning schemes, ambitiously conceived and often carried out piecemeal, gradually removed the medieval congestion of Paris, which became in three hundred years far more spacious and magnificent than any city of the ancient world.

Civic building and planning was going on all over Europe during the seventeenth century, despite the ferocious religious wars that devastated large parts of the Continent. Domestic architecture acquired certain features that were repeated, with local differences dictated by climate and national taste. The houses that lined streets and squares had a family likeness: they were unmistakably European, even in Spain where Oriental influence was still strong. This likeness depended partly on the proportions and symmetrical arrangement of door and window openings with their classic mouldings and detail, on the use of balconies and external window shutters, especially in Central and Southern Europe, and on flat or barely visible roofs, concealed by parapets above the top storey. In Northern Europe there were fewer balconies, but windows were still arranged in an orderly way, and roofs were high and steep. The habit of developing each site as an isolated unit remained, though the exuberant individualism of medieval Gothic was absent. Some respect was paid to horizontal relationships, but even when they were flouted, the oblong windows of classic design gave coherence to the street. Where blocks of buildings occupying one or more sides of a square were designed as a grand composition, the ground storey was often



St. Peter's, Rome, showing the Vatican and the Piazza, with Bernini's magnificent colonnades.

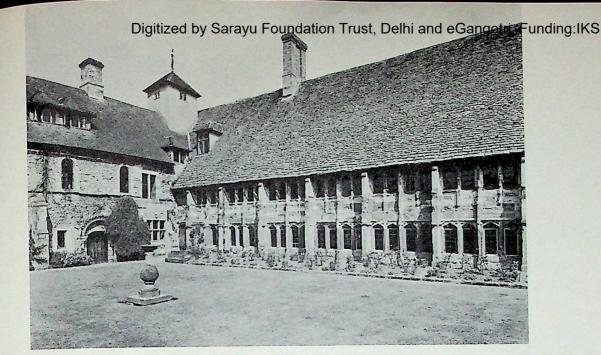
Radio Times Hulton Picture Library.



The Kremlin, Moscow, which has grown up, a city within a city, on the site of an old fort, nearly triangular in plan, and enclosed by a wall with battlements and nineteen towers. Like Byzantium and Venice, Moscow was a meeting place of western and Oriental influences. Within, the Uspenskiy Cathedral, originally erected in 1326, was rebuilt entirely in 1475-79 by an Italian architect, Fioraventi, in a style partly Lombardic, partly Byzantine, with towers crowned with Indian cupolas. Radio Times Hulton Picture Library.

The extravagant vitality of baroque is demonstrated by the nave of St. Ignatius' Church, Prague, 1655–78. From Karel Plicka's City of Baroque and Gothic.





The Prior's lodging at Much Wenlock Priory, Shropshire. Late fifteenth century. Although the windows light a corridor and a gallery, they still emphasize the vertical note that was characteristic of Perpendicular Gothic: they repeat vertical units and the possibilities of horizontal composition are ignored. (See pages 151–152.) Copyright Country Life.

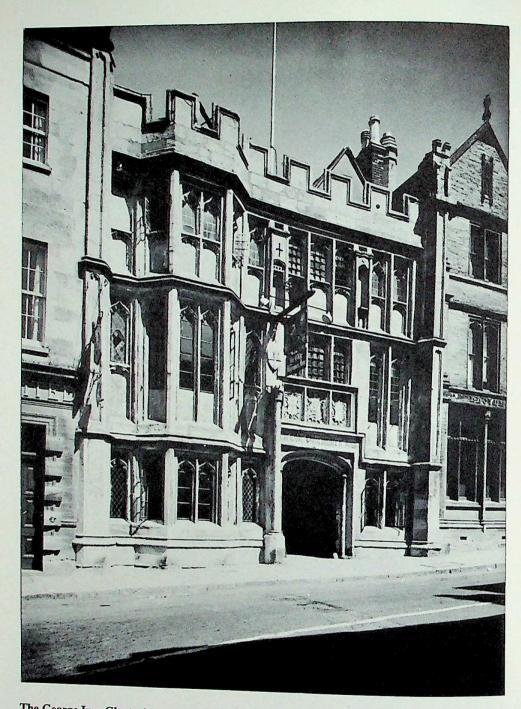
arcaded, like the houses in the Place des Vosges (formerly the Place Royale) in Paris, built about 1607 in the agreeable vernacular style.

Squares, crescents, circuses, long avenues, gardens and parks began to diversify cities, sometimes as the result of royal vision, sometimes because some wealthy aristocrat had an informed interest in architecture and discovered that building was a good investment. But whatever was built, the design accorded with the proportions of the classic orders, whether it was a baroque extravagance in Vienna, a palace like Versailles, a church in Mexico, a superb conception like Bernini's colonnades that flank the Piazza of St. Peter's at Rome, or a comfortable house in an English cathedral city.

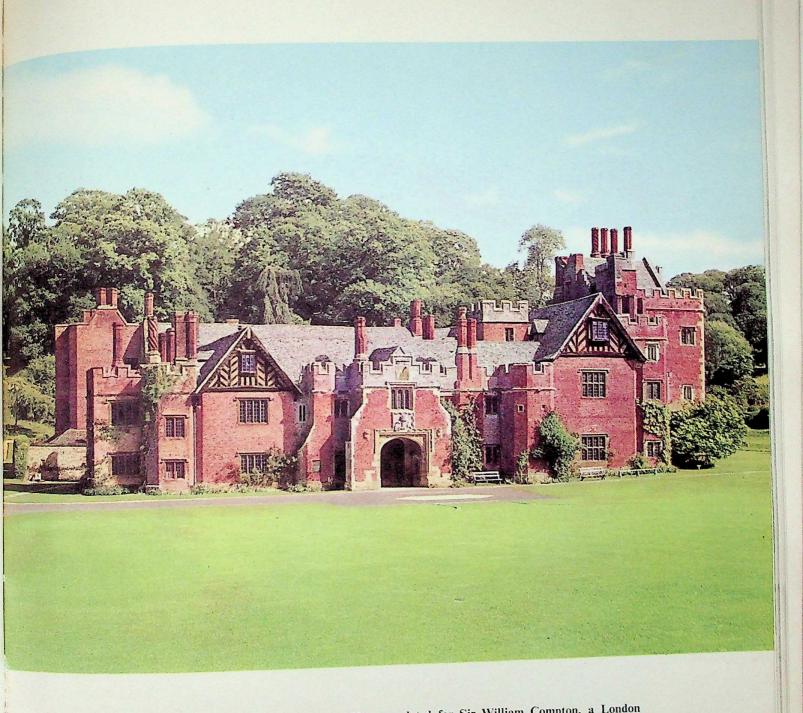
Renaissance architecture in Europe passed through three distinct periods: early, middle or classical, and late. In England, the last country to be affected by it, there were two only: early and late. Russia was uninfluenced until Peter the Great introduced classic architecture early in the eighteenth century, and invited foreign architects to his country as part of his westernizing policy. In France the early period began in the second half of the fifteenth century, lasting until the close of the sixteenth, and the middle or classical period ended with the death of Louis XIV in 1715. The later period covered the rest of the eighteenth century, including the reigns of Louis XV and Louis XVI and the French Revolution, an event that changed fashions but made no difference to the universal acceptance of the classic styles. During the brief period of the French Empire, classic design became more flamboyant, to match the vulgar love of rich display which characterized Napoleon's taste.

Renaissance architecture came to Germany from France, as Gothic had come three hundred years before, and the early period, which occupied the sixteenth century, was marked chiefly by classic additions to existing Gothic buildings, such as the portico tacked

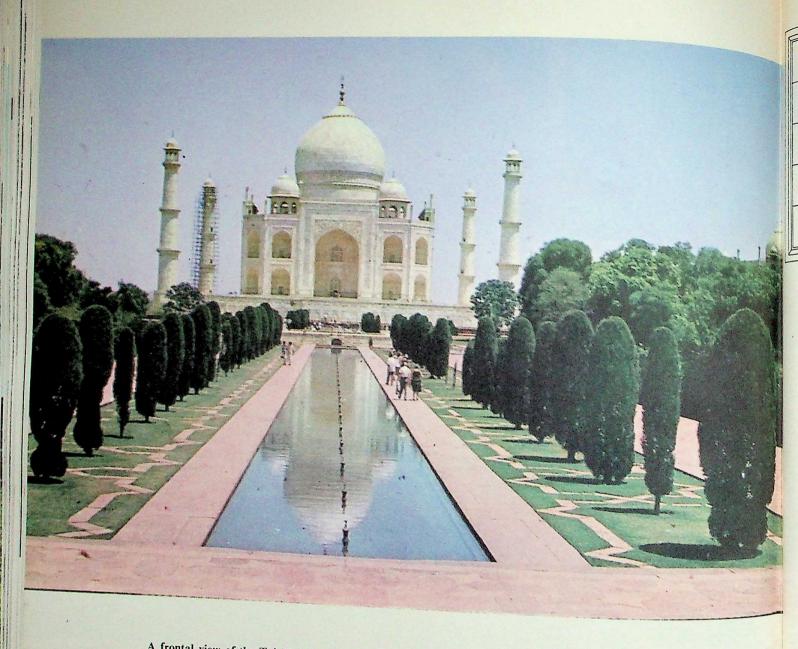
Growth and Spread of Renaissance Architecture



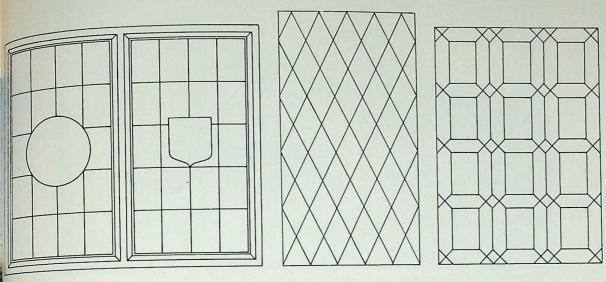
The George Inn, Glastonbury, originally built by Abbot John Selwood about 1480 as a hostelry for pilgrims. This is an example of the native style of domestic architecture that was perfected in the late fifteenth and early sixteenth centuries. *National Buildings Record*.



Compton Wynyates, Warwickshire, 1520, completed for Sir William Compton, a London merchant. An example of the native English style of domestic building, before the onset of 'Italianate' fashions.



A frontal view of the Taj Mahal, at Agra, begun in 1630 and completed in eighteen years. This building, like the Ankor Vat, is in partnership with a reflecting surface. Built by Shah Jehan as a tomb for his wife, Arjumand, it was the supreme achievement of Indian Saracenic architecture. *Photograph by Pat Smythe*.



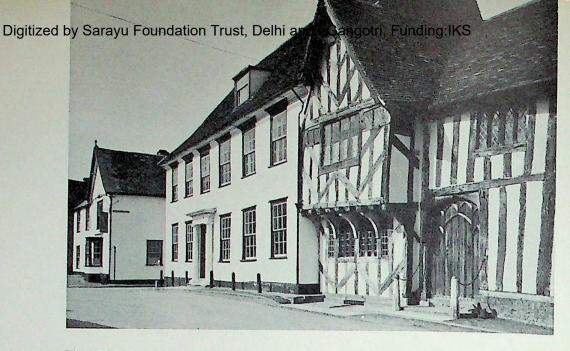
From the late fifteenth to the late seventeenth century, small panes of glass were gripped by lead glazing bars arranged in various patterns. Left: A casement window with rectangular panes, broken centrally to receive a roundel or a shield of coloured glass. Centre: The earliest and commonest pattern of glazing with diamond-shaped panes. Right: By the end of the sixteenth century glazing patterns became more elaborate like this example.

on to the front of the Rathhaus at Cologne in 1571. The middle period covered the seventeenth century; the late period included the baroque style and ended with the eighteenth century.

In Holland and Belgium there was a protracted phase of growing pains before Renaissance architecture was understood. During the sixteenth century, innumerable distortions of the orders were printed in Flemish copy books which, circulating throughout Europe, spread a fashion for intricate strapwork ornament, scrolls, sculptured figures and masks, and odds and ends of classic ornament, stirred together into a fidgety composition. These ideas were popularized by the works of Jan Vredeman de Vries of Antwerp, whose Architectura, published in 1563, was followed by his Compartimenta, in 1566, and by Wendel Ditterlin's Architectura—a collection of grotesque and complex fantasies issued in Nuremberg between 1594 and 1598. Such copy books prolonged the period of misunderstanding about the true character of classic design, particularly in Holland, Belgium, Germany and England. Other works redressed the balance of taste and knowledge: from France came du Cerceau's Architectura, 1559, and Philibert de l'Orme's Nouvelles Inventions, 1561; in England, John Shute's book, The First and Chief Groundes of Architecture, published in 1563, contained accurate copper-plate engravings of the five orders. By far the most influential of all the sixteenth-century architectural works were those of Sebastiano Serlio, a North Italian architect (1475-1552) who was accepted as the reliable and recognized authority on the orders. The treatises of Giacomo Barozzi da Vignola and Andrea Palladio appeared in 1563 and 1570, and in successive translations and editions were accepted as guides for over two hundred years.

The early period in Spain began in 1492, after the conquest of Granada, the last Moslem state, and ended in the mid-sixteenth century. This phase of Spanish Renaissance

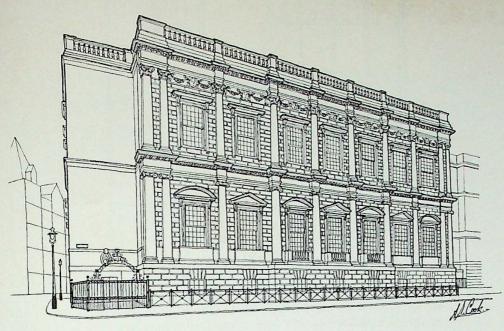
Growth and Spread of Renaissance Architecture



Little Hall, Lavenham Hall, Suffolk, shown on the right. An example of fifteenth century half-timbered construction, when the house was a sturdy oak cage into which windows and doors were framed as part of the structure, and the spaces between uprights and beams filled in with plaster or brickwork. The eighteenth-century building on the left is The Great House. Copyright Leonard and Marjorie Gayton.



Mompesson House, Salisbury, built about 1701. An early example of the comfortable, well-proportioned domestic architecture that developed in England between the end of the seventeenth century and the Victorian period. *Photograph by Herbert Felton*.



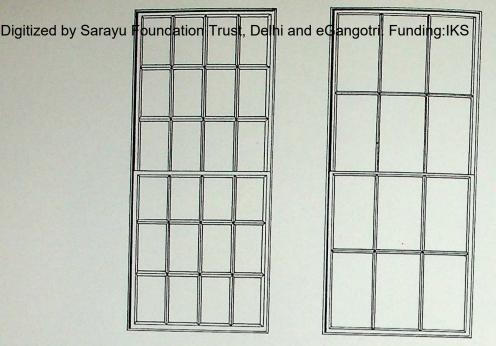
The Banqueting House, Whitehall, 1619-21, designed by Inigo Jones, the first great English architect to understand and use the classic orders as a system of design. *Drawn by A. S. Cook*.

architecture had a jewel-like quality, a decorative richness that came from the association of Gothic, Oriental and classic forms, and was known as Plateresque, from the Spanish word platero, a silversmith. The classical period followed during the next hundred years, and the later period extended from 1650 to 1800. As with Gothic architecture, all these periods flowed into each other; there was nothing hard and fast about their duration, and the characteristics of each style eventually reappeared when the classic orders reached lands where European influence had been carried by trade or conquest.

Transplanted by Spanish and Portuguese architects, the orders flourished in Central and South America. In the cathedrals and churches and public buildings of Mexico, Peru, Ecuador, Colombia, Venezuela and Brazil, they acquired an exotic air: native Indian art and the skill of native craftsmen gave florid richness to acanthus scrolls and Corinthian capitals and the moulded detail of cornices and pediments. The Dutch and Portuguese and, later on, the English, carried the orders farther East than Alexander the Great, to India and the Indonesian islands. The French and English settlers in North America had no contact with native civilizations comparable with those discovered by the Spaniards, so the architectural character of towns on the eastern seaboard was contemporary English, with contemporary French in Canada, French Florida and Louisiana.

The Renaissance had little effect on English architecture until the mid-sixteenth century, although Italian craftsmen worked on special jobs like the Monument of Henry VII and Elizabeth of York in Westminster Abbey, by Pietro Torrigiano, and the terra-cotta medallions of Roman Emperors by Giovanni da Majano, inserted in the brickwork at Hampton Court. During the early Tudor period, from 1485 to 1547, a fine domestic style had been perfected in brick and stone and half-timber. Windows had acquired a new importance, dominating a façade like the Prior's Lodging at Much Wenlock, Shropshire;

Growth and Spread of Renaissance Architecture



The double-hung sash window was introduced from Holland to England during the seventeenth century. Small rectangular panes with thick flat wooden glazing bars were used at first, but during the eighteenth century the number of panes and the thickness of the glazing bars were reduced. The window opening was often (like these examples) in the proportion of a double square.

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the bay was developed, rising through two or more storeys, as at the George Inn, Glaston-bury, originally a hostelry for pilgrims. (See pages 147 and 148.) Both buildings date from the last quarter of the fifteenth century.

Glassmaking and glazing technique had improved: lead glazing bars held a regular pattern of small, diamond-shaped panes, varied by decorative roundels or shields of coloured glass; mullions and transomes, whether of stone or wood, were thinner, and the hinged iron-framed casement was introduced so that rooms could have fresh air as well as a view. The majority of houses were of half-timbered construction—stout cages of oak, with the spaces between the wooden uprights and horizontal beams filled by brickwork or plaster, with generous windows, sometimes extending sideways from a bay or main window to form a glazed frieze above the panelled walls of ground floor rooms, and perhaps an oriel window projecting from an upper storey. The Tudor builders excelled in the art of making comfortable homes, whether they were thatched farm houses or associations of brick and stone like Wolsey's Hampton Court (which became a royal palace after the Compton Wynyates in Warwickshire, built for Sir William Compton in 1520: the size was immaterial to the character of this serene native style, with its comfort and straightforward common sense.

That style was distorted, though never wholly destroyed, by the so-called 'Italianate' fashions introduced by the new nobility, the wealthy business class that rose to power during the economic revolution which changed the social climate of England under the Tudor kings. After the dissolution of the monasteries, and the redistribution of their accumulated wealth, the Church ceased to be the great patron of architecture. The Tudor aristocrats sent their sons to Italy, from whence they returned with better manners, fewer



The works of Sir Christopher Wren, shown in a single group, dominated by St. Paul's. This drawing, made by Charles Robert Cockerell, was exhibited as a tribute to Wren at the Royal Academy in 1838. Reproduced by courtesy of the Royal Institute of British Architects.



The portal of San Agustin Acolman, Mexico. Gothic, Moorish and classical influences are mingled in this example of the phase of Spanish Renaissance architecture known as plateresque, and the details, executed by Indian craftsmen, have a vivacious character. A richly imaginative composition, designed to use the shadows cast by powerful sunlight, and the product of the cross-fertilization of European and native Indian cultures. The church and the monastery were begun in 1539 and completed in 1560. From The Story of Architecture in Mexico, by Trent Elwood Sanford.

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morals and a mixed bag of artistic notions. Popular dislike of the type was expressed by the rhyme:

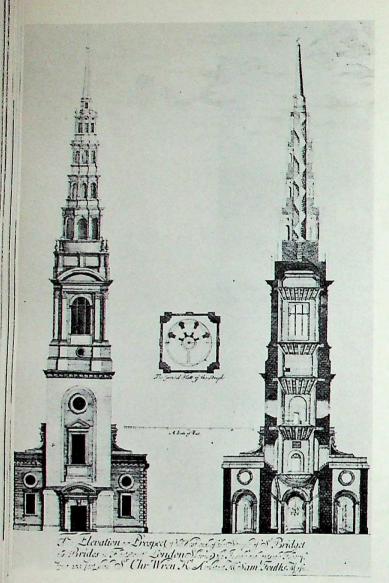
'The Englishman Italianate, Is the Devil incarnate.'

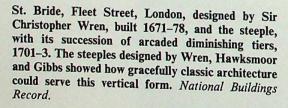
Like the French masons, English craftsmen resisted these modish ideas about architecture. The classic orders were mishandled, their proportions distorted, and their significance as a system of design unsuspected. Bits and pieces of classic ornament were lifted from Flemish copy books. The use of the classic system of design was not revealed until Inigo Jones (1573–1652), the first great English architect of the Renaissance, designed the Banqueting House, the only part that was built of the Palace of Whitehall. (See page 151.) For the first time the classic orders were used with confident understanding, not merely inserted as a feature like the columns on the ground floor of Hardwick Hall, or as an English interpretation of 'Italianate' fashion, but as the English way of re-creating a national style. The transitional period from Gothic to classic was over, and the English Renaissance began from 1619 to 1621, when the most accomplished piece of classic

This re-birth of a national style was accompanied by a re-statement of the aims of architecture by Sir Henry Wotton in his paraphrase of Vitruvius, The Elements of Architecture, published in 1624. He began his essay by saying: 'In architecture, as in all other operative arts, the End must direct the Operation. The End is to build well. Well-building hath three Conditions, Commodity, Firmness, and Delight.' For the next two hundred years those conditions were respected, and during that time some men of outstanding genius gave to domestic architecture, to churches and public buildings in England and the



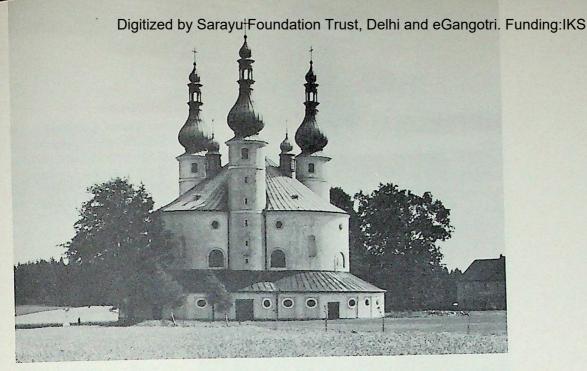
The Cathedral of Morelia, Mexico, begun in 1640 and completed in 1744. The design is in the plateresque style, and was unaffected by the baroque. From The Story of Architecture in Mexico, by Trent Elwood Sanford.







St. Mary le Bow, Cheapside, another of Wren's London churches, built 1670-73, the steeple completed in 1680. Reproduced from Thomas Malton's Picturesque Tour of London and Westminster, by courtesy of the Trustees of the British Museum.



The pilgrimage church at Kappel, near Waldsassen, southern Germany, built 1685-89. Architect: Georg Dientzenhofer. The marked Oriental appearance of the three round towers is unusual. Copyright Dr. Phil Thomas Finkenstaedt.

American Colonies, a distinctive and gracious beauty of form. Few things built or made offended the eye. The nobility and gentry patronized the arts: a knowledge of classic architecture was part of their education. Abundant common sense directed the taste of all classes, inspired the skill of craftsmen, and regulated the ideas of architects.

Apart from the use of classic details and proportions, which brought streets of houses into a happy relationship, another element in design unified the buildings of England and North America. This was the double-hung sash window, invented in Holland, and introduced to England in the latter part of the seventeenth century. (The name is partly Dutch, from sas, a sluice and partly French, from chassis, a frame.) Mullions and transomes were no longer necessary; upright rectangular windows, often in the proportion of a double square, were now divided by wooden glazing bars, generally painted white, and framing twelve or more rectangular panes.

Some idea of the contribution made by one great architect to the splendour of the English Renaissance is given by the drawing reproduced on page 153, showing all the buildings of Sir Christopher Wren assembled in a single group, with St. Paul's Cathedral, his greatest work, in the centre. Wren, Nicholas Hawksmoor, James Gibbs and other architects of the late seventeenth and early eighteenth century, perfected the classic steeple, of which two examples are given on page 156: St. Bride's, Fleet Street, and St. Mary-le-Bow, Cheapside. English Baroque, which developed late in the seventeenth century, was always under control, even when architects went in for florid magnificence on a large scale, like Sir John Vanbrugh at Castle Howard and Blenheim Palace. The Baroque phase of the English Renaissance was followed by a return to the pure classic forms, as interpreted by Andrea Palladio over a hundred and fifty years earlier, and largely through the influence of Richard Boyle, the third Earl of Burlington, the Palladian style

Growth and Spread of Renaissance Architecture

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St. Gallen Cathedral, built 1755-86, and one of the last of the great baroque churches of Switzerland. Attributed to Peter Thumb, though the twin towers are probably the work of Johann Michael Beer. Copyright Dr. Phil Thomas Finkenstaedt.

The Karlskirche, Vienna, built between 1716 and 1729, designed by Fischer von Erlach and completed after his death by his son. One of the most impressive examples of baroque architecture in Europe. Copyright Dr. Phil Thomas Finkenstaedt.



was introduced. Variations and fresh inventive uses of the classic orders continued throughout the long Georgian period in England, from 1715 to 1830.

In every European country except Italy the revival of the classic orders led to conflict between established building traditions and the new-fangled fashions, which were resented by builders largely because they were new and foreign; but obstructive resentment was followed in time by productive understanding, and the classic system of design was then used with wit, gaiety, solemnity or superlative extravagance, according to time, place and national temperament. There was no transitional period in Italy: Roman traditions had never been forgotten or wholly abandoned, and Italian Romanesque and Gothic had recalled the serene harmonies of ancient architecture; so when the Renaissance began in the early fifteenth century, Italian architects did not go back to the classic orders, but went forward with them. Any suggestion that the Renaissance was merely a period when Roman architecture was copied is refuted by such achievements as St. Peter's, where the Cathedral, Piazza and Vatican form one of the noblest and most imposing groups of buildings in the world, and the classic orders are used with a flexibility unknown in ancient Rome. St. Peter's, the work of many architects, was built between 1506 and 1626, and the entrance piazza, designed by Bernini, was erected from 1655 to 1667.

One Italian architect in particular had a powerful and prolonged influence. He was Andrea Palladio, mentioned earlier. Born in 1518, he lived till 1580, his chief work being done in his home town, Vicenza, where he designed many buildings, notably the Villa Capra, known also as the Rotonda, a square structure with an Ionic portico on each face, a circular central hall, and a shallow dome. The Rotonda inspired many imitations, though some, like Lord Burlington's villa at Chiswick built in 1725, bear only a superficial resemblance to the original. He designed the Teatro Olimpico at Vicenza, which was completed by Vincenzo Scamozzi, and inspired Inigo Jones to change the character of the English theatre. Thereafter the stage ceased to be an arena surrounded by the audience, or an elevated platform, partly surrounded; instead it was transformed into a great moving picture, with a curtained frame—the proscenium—which separated audience from players, and allowed the curtains to hide the mechanics of scene-shifting.

A book ten times longer than this would be needed to describe the works of the great Renaissance architects. Although a new accent had been given to luxury in the sixteenth and seventeenth centuries, no fashion ever got out of hand. The architect as master-designer never lost control, even in the Baroque phase of the Renaissance when buildings were almost smothered by ornament, carved in wood and stone or modelled in stucco, and then painted and gilded, until a church or a palace had a bewildering decorative complexity. But proportions were never distorted. Everything could be fitted into the framework of the classic system. Façades might follow a wavy, serpentine line, and be burdened with broken pediments, scrolls and sculpture; but the whole composition would have balance and symmetry: door and window openings would be correctly related; columns might have a spiral twist, but the space between base and capital would be the same as if the shaft had been smooth or fluted, and would accord with the proportions of one or other of the orders. In Central Europe baroque frothed over. German and Austrian architects desired to make their buildings as imaginative as possible, but their imagination was of a

Growth and Spread of Renaissance Architecture

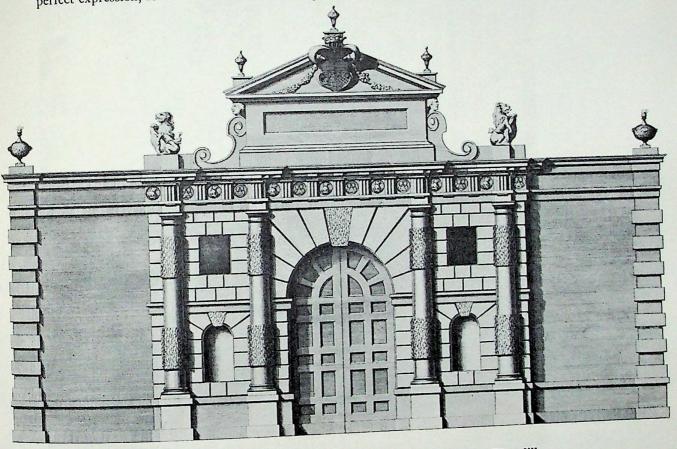


The palace of the Hungarian Bodyguard, Vienna, designed by Fischer von Erlach, and begun in 1720. A restrained example of baroque.

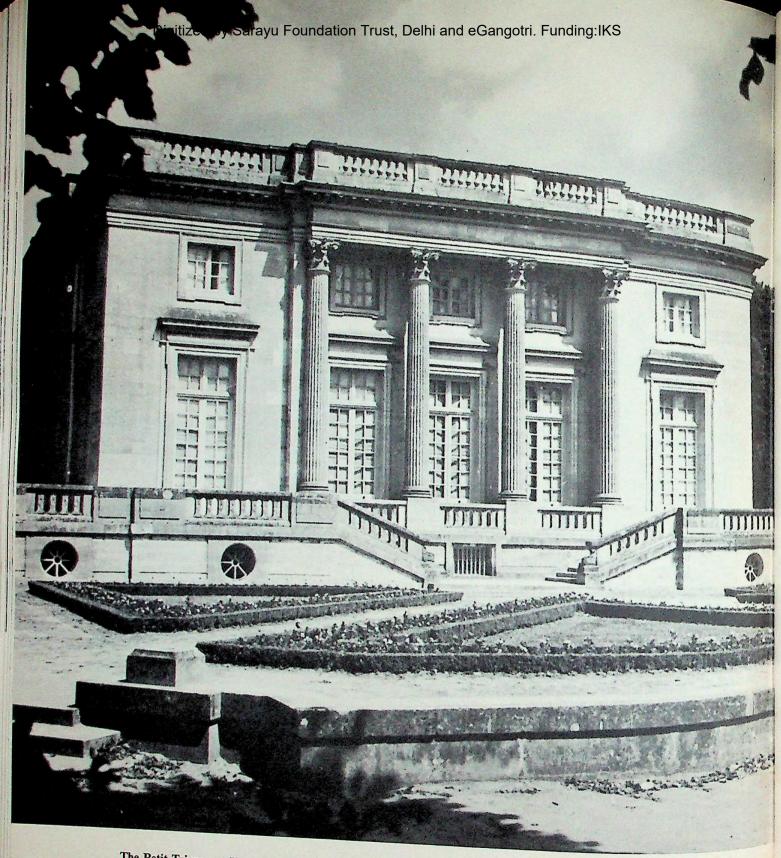
different and occasionally a coarser quality than Italian, French and Spanish. Greatest of all the Central European architects was Johann Bernhard Fischer von Erlach (1656-1723), whose work, done chiefly in Vienna, illustrates the command he exercised over lavish decorative features, which never had the touch of grossness that disfigures some German baroque buildings.

By the opening of the eighteenth century, the story of architecture in Europe had been re-told. The religious wars were petering out, and the scientific commercial age was begining. Certainly a new Age of Reason was on the way, for which classic architecture was the

perfect expression, as Gothic had been for the Age of Faith.



English restraint in classic design is illustrated by the gate of Burlington House, Piccadilly, designed in 1718 by Colen Campbell. Reproduced from Vitruvius Britannicus.



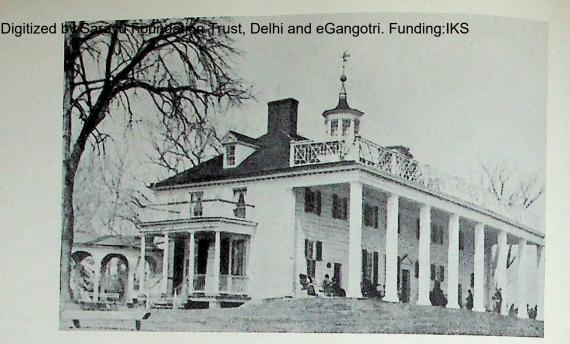
The Petit Trianon at Versailles, designed for Madame du Barry by Ange Jacques Gabriel, and built 1762-68. The tranquil façades of classic buildings in the reign of Louis XV suggested a stable and orderly society, but artificiality of the irresponsible aristocracy that made the French Revolution inevitable. Copyright French Government Tourist Office.

CHAPTER NINETEEN

The Great Century and the Master Designers

During the eighteenth century fashions in everything—architecture, interior decoration, furniture, clothes—had a French accent. The aristocracy of Europe, united by classical culture as medieval Christendom had been united by religious faith, looked to France for guidance and inspiration as they had formerly looked to Italy. By the year 1700, Louis XIV's expenditure on ambitious building projects had run into millions of francs, and the preceding fifty years had been the most expansive and magnificent period of French architecture. At Versailles the grounds and gardens laid out by André le Nôtre, and the palace, designed by Jules Hardouin Mansart, were monuments to royal vanity, eagerly imitated by other monarchs. In England, large parts of Hampton Court Palace were rebuilt in the classic style by Sir Christopher Wren for William III; the summer palace of Schönbrunn, just outside Vienna, was a small-scale Versailles; at Potsdam Frederick the Great erected a large palace, less graceful than Schönbrunn and far less impressive than Versailles; the Electors of Bavaria built two palaces, Schleissheim and Nymphenburg, and in Stockholm the Swedish architect, Nicodemus Tessin, designed a palace which far exceeded the German examples of grandeur.

Everybody who could afford to built in the grand manner. The ever-changing fashions strutted awhile, like players in a costume piece, posturing against a permanent backcloth of the classic orders. The orders represented the architectural *Establishment*, as powerful artistically as governing cliques were politically. Edward Gibbon, the historian, wrote: 'The practice of architecture is directed by a few general and even mechanical rules.' It seemed as simple as that. But then the classic system of design not only provided an accommodating framework for any kind of fashion, however fantastic: it also provided standards for critical judgement, which were understood and used with equal confidence by a wealthy nobleman or a village carpenter, a prosperous merchant or a fashionable



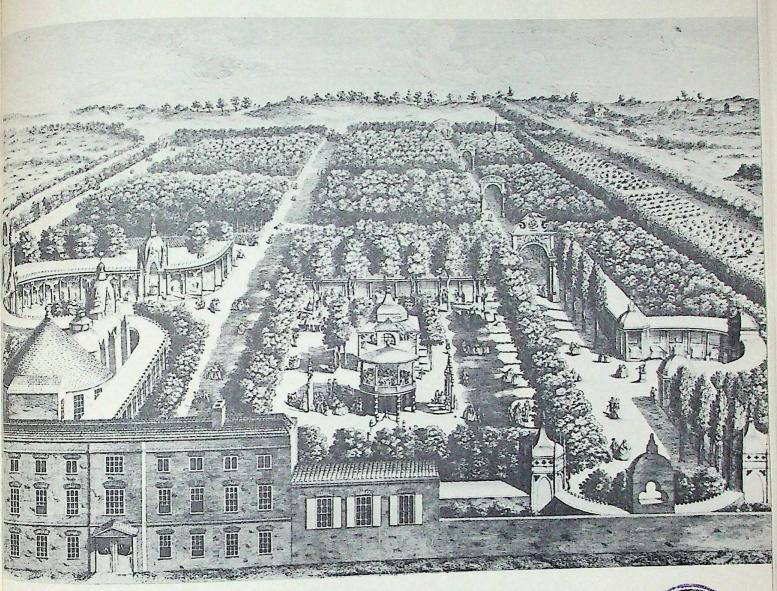
Mount Vernon, Virginia, the home of George Washington. This typical example of a colonial mansion is a regional variation of Georgian architecture, and timber-built, like nearly all American country houses in the eighteenth century. Reproduced from The Art of Architecture, by A. E. Richardson and Hector O. Corfiato.

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cabinet-maker. The secret of the eighteenth century, the great golden century of good design, was the existence and universal acceptance of these standards of judgement, which informed the work not only of the master-designers, the great architects of Europe and Britain, but the small town builder.

Although the position of the architect as master-designer was unassailable, he had shed some of his responsibilities, and had ceased to be an executant artist and craftsman like the Italians of the early Renaissance. There were exceptions: Bernini (1598–1680) was a gifted sculptor, William Kent (1685–1748) a painter and Sir Christopher Wren (1632–1723), a scientist and a prolific inventor, who had been a professor of Astronomy at Gresham College before he took up architecture. But early in the seventeenth century engineering had become a separate profession with its own trained specialists. The first record of this distinction between architecture and engineering is in 1620, when the French architect Jacques Lemercier was sent to report on a bridge near Rouen, accompanied by an engineer. This separation of art from science was as damaging to architecture as the separation of art from everyday life by fashionable taste, so that eventually the exclusive term 'fine art' distinguished painting and sculpture from common or popular art which ordinary people could understand and enjoy.

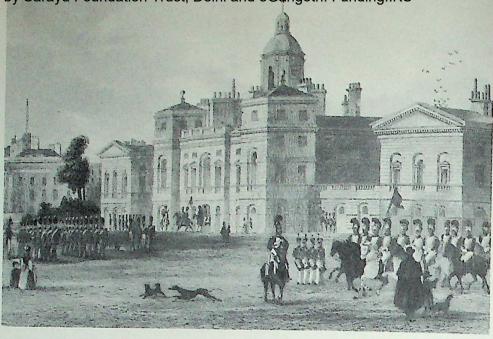
Such shifts of emphasis and responsibility changed the story of architecture in the eighteenth century, when modish society, dedicated to pleasure, ardently pursued new fashions. The Rococo style, which had grown up in France during the early part of Louis XV's reign (1715-74), was not an architectural style at all, but a continuous performance put on by ingenious decorators, charmingly frivolous, like the courtiers at Versailles, and owing something of its ornamental novelty to the artistic treasures of southern China. Rococo originated in the work of a designer and engraver, Pierre le Pautre, eldest child



All over Europe an architecture of pleasure followed a partnership between architects and landscape gardeners, and often the architect was responsible for the laying out of parks and gardens as well as adorning them with pavilions and summer houses. This view of Vauxhall Gardens, the famous eighteenth century pleasure resort on the south bank of the Thames, was engraved in 1751. Reproduced by courtesy of the Trustees of the British Museum.



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The Horse Guards, built to the designs of William Kent, after his death, by John Vardy and William Robinson, 1750-58. From a mid-nineteenth-century print.

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of Jean le Pautre (1618–82), who was also a designer and engraver who had worked in the baroque style, and as engravers were concerned with two dimensions instead of three, the style never had the depth essential to architectural character, and always clung to surfaces like a fabric, smudging or obliterating the boldness of structural lines. The name was derived from *rocaille*, meaning rock-work, and was first used to describe the artificial grottoes and fountains in the gardens of Versailles.

Rococo ornament was characterized by delicately carved and gilded foliage and flowers, slender and complicated versions of acanthus leaves and scrolls, wreaths and shells, trophies of arms and beribboned musical instruments, birds, monkeys and cupids, intermingled with Chinese frets and miniature pagodas—profusion without confusion, composed without injuring the proportions of interiors; for the overall effect was controlled, however remotely, by the classic system of design. Externally, the architecture of the buildings like the Petit Trianon at Versailles (1762–68), suggested a placid and secure state of society which the delirious turmoil of the rococo salons and boudoirs denied. Together they predicted the French Revolution. No social caste could survive that lived

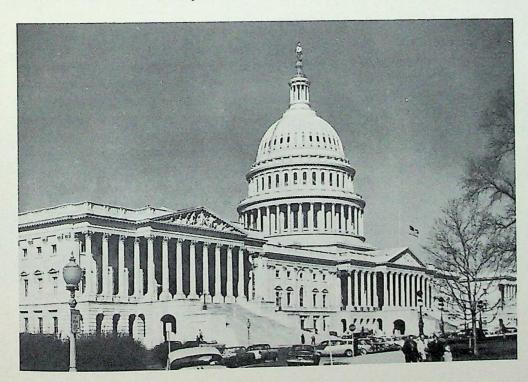
Oriental influences came back to Europe by devious routes, but chiefly through the far-eastern commercial interests of Holland, Portugal, France and England. Dynamic initiative in architectural design had deserted the East since the achievements of the Mogul emperors in India. The static character of Oriental design was unsuspected by Europeans who welcomed traditional Chinese ornament and buildings, regarding them as a treasury for enriching their own ideas, unaware that China, while producing the highest standards in art, had reached the stage of constant repetition in architecture, relieved only by minor

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Independence Hall, Philadelphia, Pennsylvania, designed by the Speaker of the Assembly, Andrew Hamilton. Built 1731-51, the admirable proportions and details show how the classic architecture of Georgian England was successfully transplanted and flourished vigorously in the American Colonies. U.S.A. National Park Service photograph.

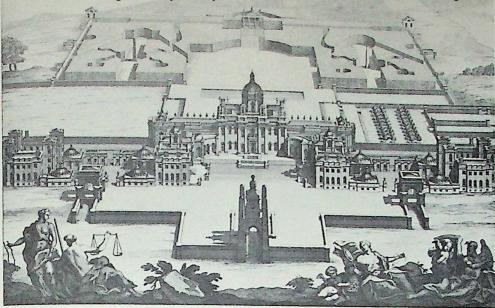
The Capitol, Washington. The central block was built 1792-1828, and the wings and dome added 1851-65. United States Information Service.





The Adelphi, the Thames-side speculative building scheme designed and carried out by Robert and James Adam, 1768-72. National Buildings Record.

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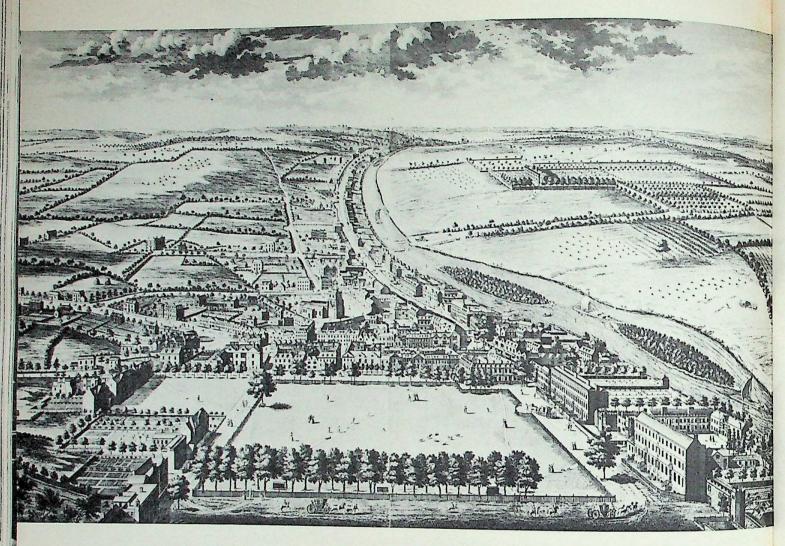
English baroque at Castle Howard, Yorkshire, 1699–1712, was architecture in the grand manner, and the architect, Sir John Vanbrugh, brought the surrounding countryside into close relationship with his composition. This bird's-eye view is a much reduced reproduction of plates 5 and 6 of Vitruvius Britannicus, Vol. III.

variations of basic forms. French taste for *Chinoiserie*, or Chinese work, in the second half of the seventeenth century, had contributed to the character of rococo. The concave Chinese form of roof was introduced for small buildings. Pagodas introduced an exotic note into garden architecture, and Sir William Chambers built one when he planned Kew Gardens in Surrey for the Dowager Princess of Wales from 1757 to 1762. Many so-called Chinese and Japanese palaces sprang up in France and Germany, but were little more than open garden houses, lightly constructed summer resorts.

Classic architecture whether Roman or Renaissance was symmetrical in composition: mass balanced mass: the wings of a palace, a country house or a public building were exactly alike and united by a dominant central feature. But an increasing interest in Chinese ideas began to sap this loyalty to symmetry, and a form of taste known in England as *sharawadgi* encouraged irregular composition. This type of composition was first discussed in an essay on gardening, written by Sir William Temple and published in 1685, which examined the comparative merits of regularity and irregularity in the laying out and planting of gardens and described the asymmetrical, or irregular, effects favoured by Chinese garden designers.

Landscape gardening and architectural design became almost as intimately related in Europe as they were in China, and in the first half of the eighteenth century a romantic interest in medieval ruins in England led to a fashion for building sham castles and imitation Gothic ruins in parks and gardens. By the middle years of the century some superficial features of the Gothic style decorated town and country houses, such as windows and doorways with pointed arched heads, and battlements above the cornice line, but the Gothic taste had no effect on the structure of buildings and little if any on their proportions, which were still classic. The irregularities of Strawberry Hill, Horace Walpole's Gothic

The Great Century and the Master Designers



Richmond, Surrey, showing the Green and the buildings surrounding it, with the gate-house and some fragments of the Royal Palace of Richmond at the right, sandwiched between what were then new houses. This is a typical small English town, really a village that expanded in importance because it was close to a Royal residence; but it is spacious and orderly despite irregular streets. From an engraving made about 1726 by Henry Overton and J. Hook. Reproduced by courtesy of the Richmond Public Library Committee.

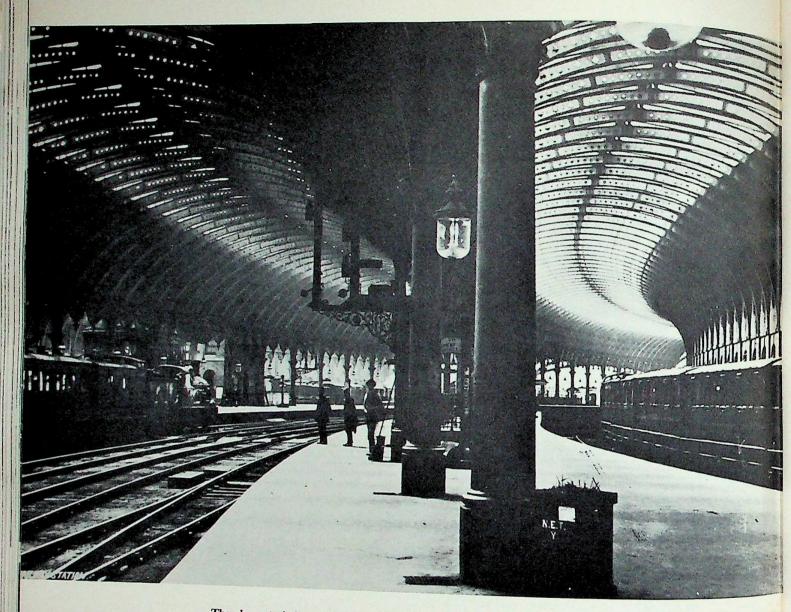
villa near Twickenham in Middlesex, were external; inside, the rooms had medieval decoration and classic proportions.

Georgian Gothic was never more than a sedate decorative fashion, although it led to such chaotic fantasies as Fonthill Abbey, built by James Wyatt for William Beckford (1796–1807), with a tower 276 feet high—which collapsed in 1807. Nothing challenged the supremacy of the universal system of classic design until the early nineteenth century. Although such fashions flitted about on the surface, the buildings of Europe, Britain and the American Colonies (which became the United States after 1776), owed their elegance and grace to the classic orders.

A taste for picturesque architecture arose in the latter part of the eighteenth century, which was really an exaggerated development of the affection for ruins, real or faked, and this undermined the classic tradition of symmetry, but all these ups and downs of modish taste were offset by periodic revivals of interest in the purity of classic design, such as the study of Palladio's works, and their publication through the patronage of the Earl of Burlington, which re-established a pure classical style known as Palladian. The discovery and excavation of the Roman cities of Pompeii and Herculanium which had been buried in A.D. 79 by an eruption of Vesuvius, roused a fresh enthusiasm for the study of antique originals. The studies of the Scottish architects, Robert and James Adam, in Dalmatia, where they explored and made extensive records of the palace of Diocletian at Spalato, resulted in a light and delicate rendering of classic forms, which introduced a style associated with their name in the second half of the century. A desire to go further back than Rome, to the great original source of classic architecture in Greece, and the issue of works like *The Antiquities of Athens*, by James Stuart and Nicholas Revett, began the Greek revival which developed during the 1790s.

Whole cities were built in the classic style: Bath, the new town at Edinburgh, Dublin, Washington—the Federal Capital of the young American republic—while town-planning schemes and extensions of old towns were being carried out all over Europe. By the end of the century the urban traditions of the Graeco–Roman world had been revitalized. The countryside, no longer overshadowed by military buildings, was adorned with fine mansions standing in spacious parks, and although from a twentieth-century point of view, many of the small towns and villages were insanitary and squalid, they enjoyed complete freedom from ugliness. Throughout the Continent, the British Isles, and the European colonies in North and South America, architecture gave satisfaction to the eye. And this was the last page in the classic chapter of the story of architecture.

The Great Century and the Master Designers



The characteristic architecture of the nineteenth century served the new industrial needs and employed industrially-produced materials, like cast and wrought iron and glass. Interior of York railway station. Reproduced by courtesy of British Railways.

CHAPTER TWENTY

Revivals and Revolution

There is a saying that inside every thin man is a fat man struggling to get out. Inside the massive buildings of the late nineteenth century a strong, slender building was often struggling to get out. The Romans had buried the arch; the architects of Europe and North America buried the evidence of the structural revolution that had followed improvements in the quality and production of steel, the invention of reinforced concrete, and the application of the cantilever principle through the use of those materials. The third structural invention had created a new architecture, but it was imprisoned behind traditional walls—walls that had once supported a building, though not now, because an inner skeleton of steel carried the weight of floors and roof. But the pretence that the wall still had a structural purpose was maintained, partly because of the age-old resistance to change, partly because the architect had parted with his responsibility as master-designer, and was now content with titivating the outside of a building. He had become a style-fancier, fitting features and ornament together as a child pastes up a pattern from odds and ends in a scrap book.

At the beginning of the nineteenth century the universal system of classic design was still intact. Europe had inherited a great architectural tradition. At no previous period in the world's history had buildings in so many varied styles been neighbours in city streets. Although the inspiration of the Renaissance was dying down, fine new buildings in the classic style were still designed, such as the Paris Bourse, by A. Brongniart, with its tall Corinthian columns and the arcaded Rue de Rivoli, by Percier and Fontaine. London had the delicately moulded stucco façades that John Nash gave to Piccadilly Circus, Regent Street, Carlton House Terrace, and the terraces of Regent's Park, while the Greek revival was expressed with rather dull dignity by the British Museum, where Sir Robert Smirke used the Ionic order with great competence, and the Doric order gave majestic magnificence

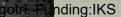
to the portico which Philip Hardwick designed for Euston Station. That superb monument of early railway architecture was deliberately destroyed in 1961. All over the Western world cities were enriched with gracious and splendid buildings during the last years of Renaissance architecture. They were as different in character as St. Isaac's Cathedral, Petrograd, by August Augustovich Monferran, San Francesco di Paola, Naples, by Pietro Bianchi, St. George's Hall, Liverpool, by Harvey Lonsdale Elmes, the Greek Doric High School, Edinburgh, by Thomas Hamilton, the Merchant's Exchange, Philadelphia, by William Strickland, and the wings and dome of the Capitol, at Washington, which were added to the central block by Thomas U. Walter (1851-65).

The architects of such buildings were still working in the living, classic tradition. Many others had transferred their loyalty to a movement that began as a romantic fashion and ended as a moral crusade. The various classic revivals, concluding with the Greek, merely disclosed fresh aspects of a system in going order. Passing fashions for Chinese, Indian or Gothic forms could easily be regulated by classic proportions; moreover, nobody took them seriously, because they were recognized as modish diversions. But when Gothic began to be identified with serious purpose, and was deemed to be the only style suitable for sacred buildings, then classic architecture became identified with an easy-going pagan levity. Gothic was used in a spirit of moral earnestness. In Britain, the Gothic Revival reflected the views of a society that was no longer pleasure-loving and rational, but comfort-loving and respectable.

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The attempt to reintroduce the methods and recapture the outlook of medieval builders led to chaos. Gothic architecture had never represented a system of design like classic: new life could not be given to its forms as new life had been given to the classic orders at the Renaissance. The Gothic of the nineteenth century was born dead on a drawing board, because all architects could do was to study historic buildings and copy with a draughtsman's accuracy the work of masons who were not only distant in time, but more remote in spiritual and artistic sensibility than the ancient Athenians. In Britain, John Ruskin, a writer of genius whose influence on contemporary taste was profound, described the Renaissance as 'a foul torrent', advocated the use of Gothic forms for everything, and was contemptuous about new industrial materials and building techniques. Many writers and architects turned their eyes to the medieval past; in a century remarkable for scientific progress, architecture was confused by 'the Battle of the Styles', classic versus Gothic, while nobody suspected that the engineer had really taken over the architect's job. He designed great industrial buildings, railway stations with vast arched roofs, like St. Pancras, London, Lime Street, Liverpool and York; he built superb bridges of iron and steel; and all too often he hid his work, with the help of a style-mongering architect, behind some

This sort of disguise was common, and lasted far into the twentieth century. A steel-framed structure like the Tower Bridge in London, completed as late as 1895, was dolled-up to look like fifteenth-century Scottish baronial architecture. Factory chimneys were built to resemble Italian bell towers or the keeps of medieval castles with battlements at the top; factories masqueraded as Venetian palaces; even the early American skyscrapers concealed their steel construction.





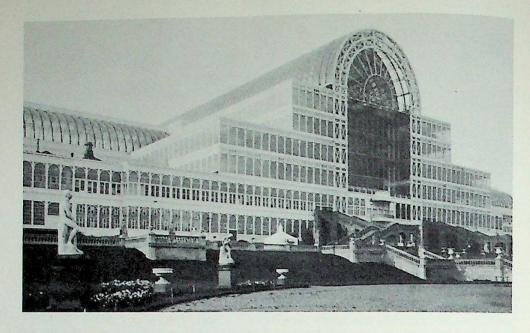
Victorian planning was superior to the individual design of many Victorian buildings. The lay-out of the area between Cromwell Road and Kensington Gardens, London, shown in this air view, was spacious and dignified and used largely for buildings dedicated to scientific and artistic studies. (The site was bought from the profits made by the great Exhibition of 1851.) In the foreground is the imitation Romanesque Natural History Museum; in the centre, the Imperial Institute, with mock-French Renaissance details; while at the top, the Albert Hall, a circular structure with a shallow dome, was impressively simple in form, and classical in character. Photograph by Aerofilms Ltd.

Two revolutions affected the story of architecture in the nineteenth century, both unidentified as revolutions in their early stages, and consistently ignored by architects. The industrial revolution, which began in Britain in the eighteenth century, produced the materials which made the structural revolution possible. The former led to a vast increase in population, a corresponding growth of towns, with slums, and the disfigurement of the countryside. In Britain, America, and later, and to a lesser extent, in Europe, the visible by-product of the scientific commercial age was ugliness: mean and grubby ugliness in industrial areas, gross and pretentious when the new rich class, that had made fortunes from industry, desired to tell the world about their wealth. The Battle of the Styles was financed by this plutocracy, and by the increasingly prosperous middle classes, who backed classic or Gothic without the critical standards and common sense that had informed their grandfathers. The golden age of good design was forgotten.

Meanwhile the beginnings of the new structural revolution were not always hidden. The great conservatory at Chatsworth (1836–40), originated by Sir Joseph Paxton, and the Palm House at Kew Gardens (1845–47), designed by Decimus Burton, were fore-runners of a new technique of using glass and iron, which Paxton perfected in the Crystal Palace, that housed the Great Exhibition of 1851. Although these were strikingly original architectural forms, they were not acknowledged as such; and when the new London Coal Exchange (1846–49), was designed by James Bunstone Bunning, the slender building was still a prisoner, for the adventurous iron and glass court was concealed behind a clumsy classic exterior.

In England great public buildings like the Houses of Parliament, by Sir Charles Barry and A. N. W. Pugin, and the Law Courts in the Strand, by George Edmund Street, were Gothic in style, though very different in character. Barry's design, classic in composition,

Revivals and Revolution



The Crystal Palace, the nineteenth century forerunner of the new Western Architecture. Designed by Sir Joseph Paxton to house the Great Exhibition of 1851. Reproduced by courtesy of the Architectural Association.

ARCHITECTURE

had Perpendicular Gothic details: Street's was an indifferent copy of the features of thirteenth-century English Gothic, but without the purpose or inspiration which gave life to a building of that time. Sir George Gilbert Scott, the most prolific and commercially successful of the Gothic Revival architects, stirred together French and Venetian Gothic details in the St. Pancras Hotel, and in the Albert Memorial showed how ornament had become, as Ruskin had said it should become, the chief part of architecture. All over Britain, the British dominions overseas, and the United States, buildings in the revived Gothic style shouldered their way into towns and cities: massive, inappropriate, often well-built, and as out of place as an armour-clad knight in a crowded railway carriage.

There were rebellions against the prevailing ugliness and shoddiness of building. William Morris (1834–96), a writer, poet and artist-craftsman, began a handicraft revival, with the object of saving crafts that were dying out as mechanical production expanded, but, like Ruskin, he turned back to the past for inspiration, to medieval art and architecture, ignoring alike the Renaissance and the possibilities and promise of contemporary industry. His teachings were taken more seriously in Europe—especially in Scandinavia—than in Britain; but many of the young English architects who came under his influence, later developed a pleasant domestic style, which had many of the characteristics of the early Tudor native style, and owed much to the example of the Red House, which Philip Webb had built for Morris at Bexley Heath in Kent.

The creative spirit of adventure in design returned when American architects began to raise their ambitious towers, and at the Paris Exhibition of 1889 two buildings openly proclaimed their steel construction. One soared up 984 feet from its two and a half acre base in the Champs de Mars, and was designed by an engineer, Alexandre Gustav Eiffel, retaining its title as the tallest building in the world until 1931 when the Empire State

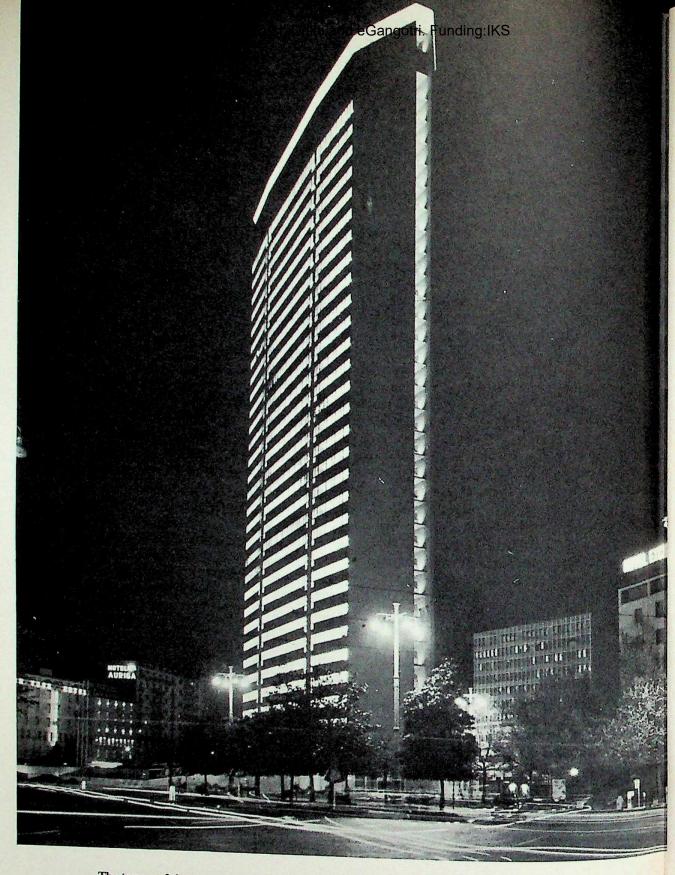
Building, by Shreve, Lamb and Harmon, went up to 1,250 feet. The other was the Halle des Machines, a huge structure of steel and glass—airy, light and graceful, over 147 feet high, 1,377 feet 6 inches long and 377 feet wide, designed by the engineer Contamin and the architect Dutert. (This was demolished.)

Although Paxton had designed the first large scale building of iron and glass, he never apparently realized that it was more than an exaggerated conservatory, and had no idea of the significant contribution the Crystal Palace had made to architecture. When he was commissioned to design other buildings, he fell back on lifeless versions of classic, though his imagination was lively enough to conceive the project of the Great Victorian Way, a colossal arcade of glass and iron, eleven and a half miles long, that was to encircle London and improve communications. (It was never built, though Parliament set up a committee to examine his proposals.) The first men who were aware of a new architecture struggling through the confusion of revived styles, were the Americans: Louis Sullivan (1850–1924), and Frank Lloyd Wright (1869–1959); the Austrians: Otto Wagner (1841–1918) and Adolph Loos (1870–1933), and the Belgian: Henry van de Velde (1863–1957). They were exceptional. The revivals continued, Gothic gradually losing ground, but Romanesque, Byzantine and a style called free classic finding favour. This last style took almost as many liberties with the orders and their proportions as the Flemish copybooks of the sixteenth century.

During the 1890s a restless ornamental fashion based on the use of naturalistic forms, broke away from traditional ideas, and was known as art-nouveau. It was not an architectural style, and, like rococo, had a greater effect on interior decoration and furnishing than on buildings. In 1897 van de Velde had designed a rest-room in the style at the Dresden Exhibition, which was startling rather than restful; but although the style was short-lived and rejected by many designers, a few architects brought its exuberant arabesques and blossoms under control. In Britain the work of a few men of genius indicated the outlines of the new Western architecture that developed in the twentieth century. Of these the most outstanding were Charles Rennie Mackintosh (1868–1928), whose principal building, the Glasgow School of Art (1898–1899) was far in advance of its time, and Charles Annesley Voysey (1857–1941), who built houses that were revolutionary in the 90s, but had a lasting effect on domestic architecture in England.

The story of Western architecture was continued by men who recognized the possibilities of concrete, steel and glass, and who used them for new structural adventures, as, seven centuries earlier, the Gothic builders had used stone.

Revivals and Revolution



The towers of the new Western architecture are pillars of light after sunset. These new offices of the Pirelli Company in Milan are 416 feet high. The great tower tapers as it ascends, which accentuates the height, and the subtle shape is derived from the structural design of the building. Architects: Gio Ponti, Giuseppe Fornaroli, and Alberto Rosselli.

CHAPTER TWENTY-ONE

The New Western Architecture

The new Western architecture has spread over the world as classical architecture once spread over the Roman Empire. When revived at the Renaissance, classical architecture had regional variations; so has the new Western architecture, which is as different in Brazil, France, the United States, England and Italy as the people of those countries.

Totalitarian states have not evolved a distinctive architecture: like Sparta, their ancient Greek forerunner, they may leave a blank page in the history of the art. Under Hitler, Germany produced a harsh, brutal type of building, of which the Brown House at Munich was typical, while domestic architecture reverted to traditional forms. Fascist Italy favoured monumental vulgarizations of classic design. In post-war East Berlin, the much advertised Stalin Allee is an ill-built, over-decorated edition of late nineteenth-century design. The vast Russian housing schemes lack the distinction of comparable schemes in England, such as those planned by the London County Council on the borders of Wimbledon Common and Richmond Park.

The schools, hospitals, universities, research laboratories and office blocks everywhere show a new grace of form, derived from their architects' mastery of the industrially produced materials and techniques of construction that have replaced or changed the nature of the traditional crafts of carpenter, mason and bricklayer. Those crafts are still actively employed in domestic building, and some old materials have new forms, such as plaster board in place of wet plastering. The small, compact houses and apartments in residential blocks have more amenities and comfort than a king's palace in the Middle Ages, though none of the spaciousness or beauty.

If the standards of life prevailing in modern Western countries are used as yard-sticks to criticize the accomplishments of former ages, a false and twisted view of architectural history follows—as misleading as the comparison of amenities between one country and



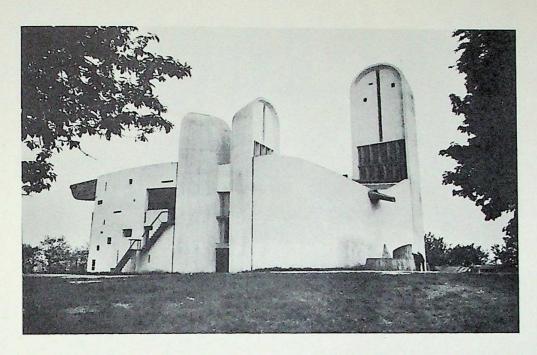
The Guggenheim Museum, Fifth Avenue, New York, completed 1959 to the design of Frank Lloyd Wright. The Solomon R. Guggenheim Museum.

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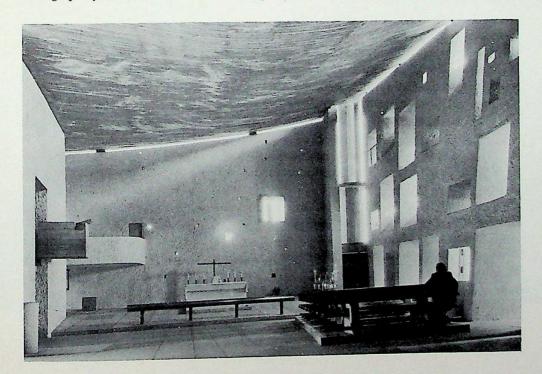
another, for amenities essential in northern Europe are unmissed in a sunny land. We have advanced during the last hundred years in health, hygiene and locomotion; but we have lost the civic and social appreciation of beauty in surroundings and architecture that was once common to every country. This sensitive appreciation of architecture survived in the East until disturbed by Western influences, but even in Japan, the first of the Far Eastern nations to become 'westernized', the native national style of building persisted, and still persists.

In the Western world nearly every big city has become the victim of unplanned and rapid growth. Our command of materials and techniques allows us to do almost anything we like with our cities; we lack nothing except the courage and enterprise to replan and rebuild them. Instead, we drive that modern equivalent of the processional way, the throughway or speedway, over and under existing roads and buildings, slicing a roaring path through a city like Los Angeles in the interests of locomotion. We could build cities in tiers, above and below ground level; instead we insert patches of new development, necessarily short-lived because of the nature of industrial materials.

Churches and civic buildings alone have a quality of permanence. They are not built for an economic life, and are often of traditional materials, like the Town Hall at Stockholm by Ragnar Östberg, the last romantic building in Europe, or the new cathedral at Coventry, by Sir Basil Spence, which may come to be recognized as the greatest architectural work of the twentieth century, and alone of all the large-scale modern churches of Europe belongs to the age it serves. Church architecture inspires a new approach to the use of modern materials, as exemplified by the Chapel of Notre Dame du Haut, Ronchamp, by Le Corbusier, boldly irregular, and—by the dominance of solids over voids—reversing everything Byzantine, Gothic and Renaissance church architects achieved and

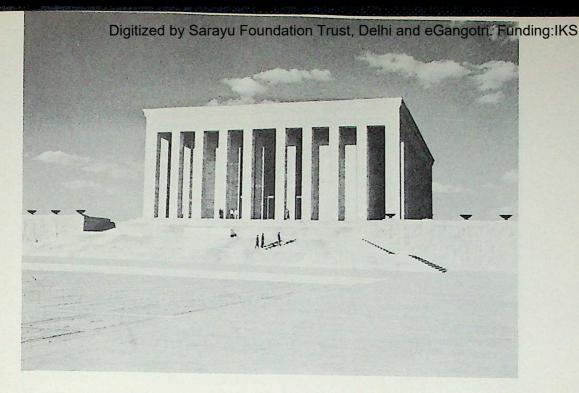


The Chapel of Notre Dame du Haut, Ronchamp, by Le Corbusier: an irregular composition that completely reverses the Gothic triumph by allowing solids to dominate voids. Above: Photograph by Edward D. Mills. Below: Copyright Lucien Hervé.





The new cathedral at Coventry, designed by Sir Basil Spence, O.M., PP.R.I.B.A. Copyright The Times.



The Mausoleum of Kemal Attaturk, at Ankara, a monument of impressive simplicity. Enrico Mariani.

revered. (See pages 100, 114 and 181.) New flexible forms may be created when concrete is used by an architect of genius, like Frank Lloyd Wright, who designed the Guggenheim Museum in New York, shown on page 180.

The imagination of the architect is always the essential ingredient in design: without it, a building may be functionally perfect, but squalidly dull. Imagination, trained and equipped with technical knowledge, has been responsible for all the changes and advances in five thousand years of architecture. Those changes are perpetual, for architecture is a flexible art, and although for long periods it may remain flexible within the framework of a system of design, like the classic orders, if change is denied or repressed forms that were originally full of vitality become petrified and boring. That happened in Egypt, but not in Greece, for the Greek mind was too volatile to tolerate dull repetition.

Looking back, then, over the story of architecture, we can see the dynamic contribution of European civilization to technical progress, which led ultimately to the new Western architecture. Again the architect and the engineer—separated only since the early seventeenth century—are tending to merge; again architecture is on the move, advancing to new adventures. For over a hundred years men have been afraid of letting their inventions in structure tell the truth, disguising results and pretending that the great buildings they were putting up were really old buildings magnified instead of new buildings falsified. The early skyscrapers of Chicago and New York were dolled-up to look like enormous exaggerations of traditional buildings. We have rediscovered the tower as an architectural form. In the past, towers have been built for defence, for pleasure, for pure snobbery, like the towers of San Gimignano, that medieval Italian town where rich men out-built each other as a form of social aggrandizement, or the towers that were tacked on to all kinds of houses in Victorian England; but now, once again, towers are part of a living architecture.

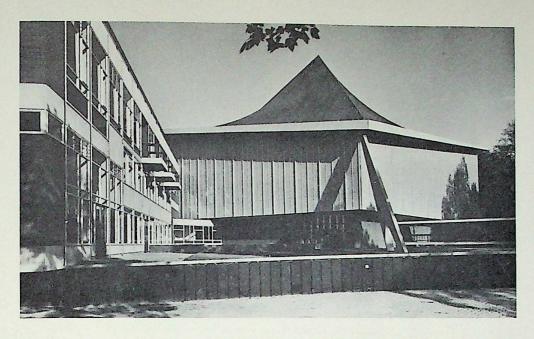
The New Western Architecture



The Millbank Development for Vickers Limited, viewed from Lambeth Bridge. The tower block is 387 feet high and the frontage of the horizontal block is 650 feet. Architects: Ronald Ward and Partners. Compared with those of American cities, the new towers of London are modest in height; there is nothing comparable with the Empire State Building or the Chrysler Building in New York, which rise to 1,250 and 1,056 feet above street level.



The Acroyden Estate, one of the large housing schemes planned and built by the London County Council on the borders of Wimbledon Common. Architect: Sir Leslie Martin. Reproduced by courtesy of the London County Council.



The Commonwealth Institute, completed in 1962, in Holland Park, Kensington, London. Architects: Sir Robert Matthew, Johnson-Marshall, and Partners. Copyright John Lang Ltd.

In the future there may be comparatively few permanent buildings, if present trends continue, and an economic and mechanical view of architecture is established. In the 1920s an over-simplified idea was popularized by the phrase: 'A House is a Machine for living in', which appeared in the translation of Le Corbusier's *Towards a New Architecture*. This ran contrary to the ideal of home, which among the peoples of Northern Europe, and particularly among the English-speaking peoples, was a symbol of family life and social stability. If houses were to be regarded merely as machines, like motor cars, the whole structure of life would, in a few generations, be changed. Houses have machine parts: the heating, cooking, air-conditioning and plumbing appliances; now, through labour-saving inventions, the mechanization of the home has increased. Extremes of climate have been conquered by modern technology. So far, the influence on domestic architecture has been slight. There may not be a marked effect on design for generations, because, although you may offset the extremes of climate inside a house, once you step outside, you are again too hot, too cold or too wet.

One of the great experiments in domestic architecture was the building of new towns in Britain after World War II. They started from scratch; they were planned with care, and free from all the inconveniences of age-long, haphazard growth. They were also as destitute of character as a Roman camp, for variation, deliberately contrived, may become as dull as utilitarian uniformity.

The architecture of democracy has not yet arisen; when it comes, its true character will be recognized by our descendants, not by us. The story of architecture is unending.

The New
Western
Architecture

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